

*Your*

An Argus Specialist Publication

DECEMBER 1984

88p

**NEW**

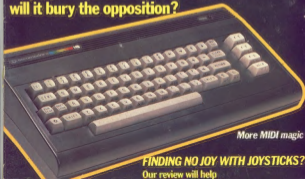
# COMMODORE

**YOUR BEST INDEPENDENT COMMODORE MAGAZINE**

**NEWS, SOFTWARE AND BOOKS**—the pick of the bunch

**EXPERT GUIDANCE AND HELP WITH YOUR PROGRAMMING**

**THE COMMODORE 16 HAS LANDED—**  
**will it bury the opposition?**



*More MIDI magic*

**FINDING NO JOY WITH JOYSTICKS?**

Our review will help



# Alice IN VIDEOLAND



**NOW  
ON  
CASSETTE!**

## PURE MAGIC!

Join Alice in her journey through Videoland - an enchanted place populated by strange creatures such as bread-and-butterflies and pipe-smoking caterpillars, where little girls change size and flamingos turn into croquet masters!

*Alice in Videoland* is a revolutionary new concept in entertainment for the Commodore 64, incorporating some of the finest graphics ever seen on any home computer, accompanied by a charming musical score. There are four different game screens involved, and your performance in earlier ones will affect your ability to get through later ones and determine your eventual total score.

**Scene One** - Stunning tile-jpeg graphics give way to the first game scene as Alice falls into the rabbit's warren. Score points for collecting the objects to be found there - including keys to open doors, bottles to make her smaller, cakes to make her bigger!

**Scene Two** - Out in the garden the Cheshire cat looks on as Alice meets the pipe-smoking caterpillar. Help her to catch the bread-and-butterflies and the ticking-horse flies that change into the bats used in the croquet game in the last scene!

**Scene Three** - Alice is a pawn in the chess game where her opponents are the Jabberwocky and Tweedledum and Tweedledee. Help her across the board by protecting her with your White Knight!

**Scene Four** - The most bizarre croquet game ever! Help Alice hit the balls through the playing-card-soldier hoops before the Queen of Hearts stomps on them!

*Alice in Videoland* is available for the Commodore 64 on disk - £12.95, and now on cassette - £9.95.

*Alice in Videoland* features graphics created with the Koolha Plot.

# Audiogenic LTD

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# Our COMMENT

Your editor spares a few seconds of her precious time to introduce another issue of Your Commodore.

WELCOME TO THE THIRD issue of Your Commodore. If you've already fingered through the pages, then I shouldn't tell you that, once again, it's jam-packed with the latest news, reviews, games, utilities, special features and much, much more. If not, then bear with me until curiosity keeps you to turn the page.

Since you last turned your eyes upon a copy of Your Commodore, they've been working their fingers to the bone over in Commodore. Not only have the long-awaited '86 and Play A machines been launched and exhibited to the world at large, but a host of new peripherals and software has also been released. How well the '86 fare in the face of growing competition? Read our article and judge for yourself. Commodore have also finally unleashed their Commodore 64 Community: a new online service for Commodore users. But now I'll have to see next month's Your Commodore for the low-down on this.

## Showtime

Everybody loves a show and the 7th PC W show was certainly no exception — thousands of computer moguls, journalists, games, books and specialist programmes mingled through the corridors of Olympia 2 from 19th-22nd September. With winter already well underway and Christmas on the horizon, the time is ripe and the market ready for new

releases — all too evident with the hoards of offerings from software houses up and down the country. Wags displayed included not only the new Commodore machines but a side of software, books and peripherals such as Canali's SpeechKit.

## Lend me your ears

Talking of which, Your Commodore is louder this month. Come are the days when the only host of music

emitting from the confines of your house might be Radio 1 for you enjoying your early morning bath. Your Commodore is competing in the music stakes. We bring you the initial installment of our two-part MIDI series and we also hope to get your fingers tapping and your ears buzzing with a guide to two software packages — MusiCalc and Music Master — which transform your Commodore into a music synthesiser. Whoever suggested that new technology was breeding a nation of philistines!

## Reader Input

So, as much as we prefer software houses to present all the latest releases for exposure to our reviewers, tell us we may owe our trusty typewriter to living you prod and encouraging articles, where would we be without you, our readers? We anxiously await your praise and criticism, your comments and ideas. Are we listening for your needs? Are there too many games — or too few? Services — or too light-hearted? We're quite pleasurable here — so drop us a line or give us a call. Prick it above us — we don't mind so long as you get your views across. Thank you to everyone who has already put pen to paper: we shall endeavour to answer all your letters.

Your comments about a world of buzzed VEC 20 owners. We want to build your needs — but our supplies are low. So, here better to pass those long winter nights than by retiring to a warm corner and conjuring up weird and wonderful games and utilities on your VIC 20. And, all right, we don't expect you do "programmers' retrospectives" to the string idle either. Get tapping and share your genius with us humble mortals! Send your output to the editor: you'll find the editorial address on the next page.



# COMMODORE



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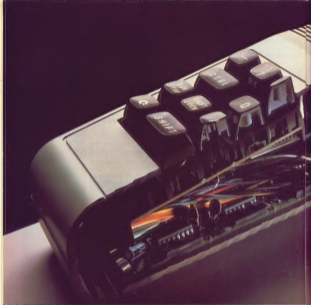
We take a look at some of the new releases on display at this year's PCM show.

## BEHIND CLOSED DOORS 88

We open the door to reveal John Wagstaff and Craig Communications.



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# Are you only using

To play only games, even a Commodore computer is like asking Albert Einstein to work out the square root of four.

The computer's brain barely ticks over.

To really stretch it, you need more interesting software programs. For example, record keeping, interactive education, stimulating adventure games or word processing.

And for these you need peripherals.

Like a Commodore disk drive, a really fast storage and retrieval system with a vast memory.

Or a Commodore cassette unit, the inexpensive way of loading and storing programs.

For those who like the idea of text and graphics being more alive and having greater clarity than on a TV, there's the Commodore colour monitor.



COMMODORE 8240  
Dot matrix printer (240x30)  
Printer feed: Print speed  
50 characters per second



COMMODORE 8240  
Dot matrix printer (240x30)  
Printer feed for standard  
paper: Print speed  
60 characters per second



COMMODORE 8240  
Dot matrix printer (240x30)  
Printer feed for standard  
paper: Print speed  
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COMMODORE 8240  
Dot matrix printer (240x30)  
Printer feed for standard  
paper: Print speed  
60 characters per second



COMMODORE 64  
64 K, for Commodore 64

COMMODORE 64  
64 K, for Commodore 64

COMMODORE 64  
64 K, for Commodore 64

COMMODORE 64  
64 K, for Commodore 64

COMMODORE 64  
64 K, for Commodore 64

# 1/10th of your brain?

And for hard copy there are our three printers and a printer plotter. These will preserve on paper—in colour, black and white, chart form, graphs or text, the fruits of all your labour.

Finally, to make games playing more exciting, there are joysticks and paddles.

So use your brain. And make sure you use all of your computer's brain.

FOR FURTHER INFORMATION, FOR ONE OF THE BORDS ABOVE AND SEND TO THE COMMODORE INFORMATION CENTRE, 1 MILLERS ROAD, WELDON, COVENTRY, NORTHAVON CV5 7LN. TEL: 02461 45500-45502.

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PC 100 1984



**commodore**



## 64 Tape Computing adds a new dimension to your micro!

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# E- DATA STATEMENTS

## Multiple birth at Commodore



Write of plate in this month's news from Commodore Business Machines must go to the launch of their two new machines: the Commodore 16 and the Plus/4. Howard Stark, General Manager of Commodore Business Machines (UK) Ltd., hopes that these two machines, along with the 64, will "form the strongest range on the market over the Christmas period".

The Commodore 16 has been designed as a successor to the VIC-20 and will be sold as a complete starter pack, at £199.95. It includes 16K RAM, a full typewriter-style keyboard, sophisticated sound capability,

127 colours for high-quality graphics and advanced BASIC. The starter pack contains the computer, cassette deck, instruction to BASIC, ports 1 and 4 recreational software packages. (The 16 is reviewed elsewhere in this magazine).

The Commodore Plus/4 is described by Mr. Stark as "...an affordable home computer for the more serious user". And, in an attempt to prove the point, it comes with 4 integral programs: word processing, database, spreadsheet and business graphics. But he does stress that the Plus/4 "...is not a fully-fledged business

machine. It is a comparatively-priced home machine ideally suited to the professional who wants to use it for productive applications". The Plus/4 contains 64K RAM, of which 32K is available in the user for BASIC programs and includes, amongst the more obvious facilities, advanced BASIC, screen window facility, a HIMP key and simple cursor controls. It retails at £299.95.

Both machines are being manufactured at the new Commodore factory in Corby and should be available at the end of September.

Further Commodore also promises to roll out Christmas

stockings with other goodies. A new cassette deck, the 1501 cost — £44.95 and a new single disc drive, the 1541 cost — £199.95 should soon be available. Also in the Commodore Christmas package this year can be found two new printers compatible with the entire range of Commodore home computers. These are the hiCS 800, a colour dot matrix printer, and the DPM 1001, a low-cost letter quality printer. Both models will sell for £99. Both Commodore and the leading software houses are developing a range of software for the 16 and the Plus/4.

## Creditable Interface

The Acorn Computer Company of Stockport have developed a serial interface cable to connect their RS232 serial printers to the Commodore hi VIC-20 or 1500 Portable. The unit, which is supplied with instructions and a 1-hour guarantee, is available by Mail Order at £24.95 inc. VAT and post from Acorn Computer Company Ltd, The Computer Centre, 61 Shaw Road, Macclesfield, Cheshire, SK5 6BN. Telephone 061-427-4871.



## Show-down at

## Olympia

The curtain was raised and the chips were down at the end of September for the Seventh National Computer World Show. Although the companies displaying their latest wares for the 64 were Anlog, Argon Press Software, Authorgenix, Bubble Box, Creative Sparks, Melbourne House, Pioneir, Canals and many more. We reveal all about the PCW Showtoppers elsewhere in this magazine.

# DATA STATEMENTS

## Get in touch with your 64

Touchmaster Ltd, have released their pressure-sensitive surface which, complete with its own microprocessor, is able to interface with a range of micro and personal computers, including the Commodore 64. Touchmaster, as the device is called, hopes to overcome resistance to keyboard usage.

The Touchmaster has an 8.4 working surface and a resolution of 288 x 384. The surface is fully linear across the active area and does not use any moving switches or similar devices.

The company plans to develop a catalogue of software — to be called Touchware. The first releases of software specifically designed for the Touchmaster include graphic packages, educational early learning programs, board games, arcade games, adventure games and programmer editors.

The complete package to be marketed will contain the Touchmaster, Touchware multi-point graphics program and other accessories required for immediate use with a home

computer. The recommended retail price is £149.95. Touchmaster may be contacted at P.O. Box 3, Port Talbot, West Glamorgan, SA13 1WH.



## Currall speaks out

New for the Commodore 64 from Currall Computer Components Ltd, is the Speech 64 which was developed in conjunction with General Instruments. It is an allophone speech synthesiser which means that it uses individual speech sounds strung together to make intelligible speech. It has an unlimited vocabulary and its makers claim it can synthesise any word or sentence in the English language.

Speech 64 features a 'say' command which provides text-to-speech, a high and low voice such as its own, intonation and intenal BASIC commands. It is a hand-sized unit which plugs directly into the back of the Commodore; sound is gener-



ated through the E/C receiver.

Currall's speech synthesiser retails at £29.95. Currall may be contacted at Graythorpe Indus-

trial Estate, Harbottle, Cleveland, TS15 2DF. Telephone 0429-75996.

We hope to review Speech

64 in next month's issue.

## PSS hit the road

From the end of September, Commodore 64 users can get on their buses with the latest offering from Pib. Instead of a robot, it is a high-tech representation of the pop art star, Bata Bata. It enables up to four players to tell it to go, not go, taking maneuvers and from a straight line, through obstacles which, being jump, high jump

and being traps to compete for the accolade of Bata's champ.

The bike is controlled via cursor or keyboard and basic features include table top, wheelie, on down, ramp, speed bumps, ditches and stop offs. Hyper Bata is available at a cost of £29.95. Pib may be contacted at 452 Station Road, Cooney, CV9 5QJ.



Available on Commodore 64/65



## Stateside

In the wake of their success with their Commodore, Amiga Chase and Big Bang, State Soft have released to new games for 64 users, Boulder Dash and Bristles.

In Boulder Dash our hero, Rex, third, has to establish his box, dice, walls of rock and assorted treasures as he digs for the gleaming jewels. In pursuit of the diamonds he must turn his enemies to his advantage — for example, his enemies may be turned into precious stones. The mysterious escape tunnel is revealed only once the required number of diamonds have been collected. The game includes 16 mystic caves with a playable maze game allowing 4, and 5 levels of difficulty.

For all non-DIP enthusiasts, Bristles takes the part out of dropping. The object is to

pass it to the enemy without being without losing your business before time runs out. There are 8 different game screens and 8 and levels for each. Finally, your target is to pass all 8 buildings in each level. While following your task, you must avoid the Barker Chances, the Dumb Busters and Flying Half-Pins. Life and stars are provided for your transportation — but beware the monster's daughter as she steals your car! If you passed walls with her hand, your four stars are awarded with prizes.

Both games are available on cassette at a reduced £19.95. State Soft are at the Business & Technology Centre, Science Drive, Newquay, Cornwall, PL1 2DQ. Telephone 0850 535361.

## ULTIMATE BATTLE LEADER

Legend, creator of the 1984 Game of the Year, Ultima, have announced details of their latest release, The Great Space Race, scheduled for release on the Commodore 64 in late September/October. chairman John Peal describes it as a "...completely new kind of computer entertainment — one that goes beyond attack and adventure games, but opens the best elements of both."

He certainly believes Legend's newest baby looks good. With a sleek, shiny opening

screen, MICROSOFT 2, his new claim the "...most solid 3D graphics..." have been achieved and "advanced graphics enable the characters to seem to be seen..." (unintended cleavage?)

The game falls into two phases in the pregame screen you must compete for the best spaceship, weapons and personnel for your team. The second stage involves a rare aspect "...with natural obstacles and your competitors."

Using a new form of single keypress commands, the



Great Space Race enables characters to offer you options based on the current situation through an "options generator" constantly monitoring game development.

The Great Space Race costs £19.95, which is a great price which is thought to be the largest amount ever spent on the development of a single game. Legend may be contacted at P.O. Box 455, Science Road, London SE16 5PL. Telephone 01-524-8554/5.

# E- DATA STATEMENTS

## The Professionals

Aud opinion Ltd, has launched their Professional Range of business application software for the Commodore 64. The three packages in the range are a word processing system, Micro Wordcraft, a spreadsheet facility, Acute, and their database system, Magpie.

All three packages are developed and retail at the following prices: Wordcraft — £19.95, Acute — £19.95, Magpie — £19.95. Audio opinion Ltd may be contacted at 19 Suttons Industrial Park, London Road, Reading, Berks RG6 1AL. Telephone: 0734 644446.

## Terminal Appointments

Terminal Software has been for some while in developing 'Lucky Jones', their new game for the 64. There are 18 clues in it and, behind each, lies the opportunity for Lucky Jones, the most info and hotel owner in the trade, to avoid more hectic busy games, hide in the lounge cupboard, drink in the bar or go to the toilet — anything to avoid the ever-managing of the ghost of the previous manager.

'Lucky Jones' features a top screen window and retail at £7.95. Terminal Software are at Derby House, Derby Street, Bury, 089 5946. Telephone: 053 781 4321.



## Things that go bump in the night

Who would have thought of David Darling (18) and his brother Richard (16) eleven months earlier such and they being even but then unexpected things started happening round them. It all began at the beginning of 1989 in Canada when they acquired a VIC-20. From that moment on they found they had a talent, an unexplained power, call it what you will, which they have been attempting to harness ever since. At first it was just odd little things they picked up but more recently those powers have been transforming themselves into a complete dimensional hierarchy: ghosts, greys, demons and poltergeists. The source of this power has been traced to the Commodore 64.

Surprising, nobody seems to be at all concerned. Rather the opposite for the Darling brothers are on the list of authors of the new game for the C64 by Peter MacIntyre, called Chiller. In it you are given the task of removing evil influences from a haunted mansion while it wanders all the unwanted attention of the alien-mechanical dangers of



the underworld. And at £1.99 it was you're assured of a cheap shot.

That delightful fact when there are so far within 16 games, including about a third of MacIntyre's output (just Space Mule and 8000 Bares, both for the C64 64), are also missing in a game designed for the new Commodore 16. That is I bet these third games designed this year and 60, owing one they did for the VIC-20,

released on the Commodore 16, and the Commodore Creator for the C64 64, due for imminent release from Microsonic.

The Commodore 16 will be ready in about 3 months time and will be marketed by Commodore itself. The brothers have a ready team working off a £.16 for a couple of months now so that I am confident about such prediction in their opinion of the much on 'Terminal' again is a

as good as the 16 — the two disadvantages are the lack of games and the sound — they told us. Still, a good games designer should go a long way to solving the first problem.

So, with all this activity it is hard, very difficult that the Darlings, less than will be disappearing without trace. MacIntyre (14) can be contacted at Park Lane, 171 Park Road, London NW6 7JL. Telephone: 01-462-9176.

## Tell and trouble from

### Creative Sparks

Creative Sparks have announced the release of their new adventure game for the Commodore 64, *Masterly* — the Computer Adventure. Based on the Bard's games, it may be the game comes at two full-loading cassettes, with a full set of instructions plus a complete text of the play. The player can participate in four interrelated adventures, plus psycho-analysis sessions giving the player an insight into the game and motivation of the leading characters. The adventures all offer their own special twists and contents, each depict a



scene from Shakespeare's original plays.

Creative Sparks are part of THORN (P&H), David Goring general manager for THORN Ltd Computer Software Publishing Unit of Modern. "We are delighted to be publishing this ingenious package. It is full of unexpected twists and turns, rich in dramatic meanings, alive with traps, puzzles."

Masterly — the Computer Adventure, priced at £14.95. Creative Sparks can be contacted at THORN Ltd Computer Software, Thompson House, 266 Farnborough Road, Farnborough, Hants, Telephone 0703 161333.

## Art for Commodore's sake

The first prize of a £5,000 endowment and £15,000 worth of computer equipment in the way of a first competition to see some computers, to create works of art, the Commodore International Art Challenge, went to Hugh Riley, a young commercial art graduate. As a result of his winning entries in the Mr Dynamic category, Lines (Illustration Institute 104) and Observations, Mr Riley will be able to use the endowment to study computer art at a prestigious educational establishment in the country of his choice and hopes, as a result of this unique opportunity, to pursue further in computer graphics.

The award was presented by Professor Brian Allison, World President of the International Society for education through Art, at a ceremony at London's Business Gallery. Professor Allison commented that "The

Commodore Art Challenge has revealed a fascinating new area for art and for home computers. I am convinced this initiative and the exhibition of computer pictures are just a glimpse into a future which will see art and technology increasingly working together."

The competition was divided into full and dynamic entries and under 12, 13-17 and 18 age groups. The winners in

each category received £5,000 worth of Commodore equipment and their names added to the *Journal of the Society of Artists*. Mr Josephine Wren of London won his entry, "Mr. Frostman", winner of the prize for the best new 16 Entry.



## Commodore's sales

### boom

Commodore UK's sales topped the \$100 million mark during the last three of last year, thus showing an all time record and making the company a major contributor to Commodore's international record. \$8.27 bill on sales for the year ended 30 June, Mr Howard Schwartz, General Manager of Commodore Business Machines (UK) Ltd., believes that "in business terms" this makes Commodore "the undisputed leader in the British home computer market."

## New face of Commodore

Ric Porter has been appointed as new Software Products Marketing Manager at Commodore UK. He expects to be "looking particularly for software which makes maximum use of the full capabilities of our machines — not only the VIC-20 and Commodore 64, but also the new Commodore 16 and Plus/4 home computers." Mr Porter believes that "The mass market for software has arrived and with the enormous launch of the new Commodore 16 and Plus/4 computers, Commodore is in an unprecedented



position to dominate, not only in hardware, but also in software."

## Soft deal

Commodore dealers will now be providing 5 software packages with every \$2960 business machine sold. These are: SuperScript, a word-processing package (including spelling checker); The Manager, a comprehensive database and file management package; and Calc Result, a financial planning spreadsheet.

The \$2960 with integral display (happy dot) drive, 128K RAM, monitor, keyboard and the above-mentioned software packages retail for £1499 including VAT.

# DATA STATEMENTS

## CompuNet launch

The PCs that will see the launch of the Commodore Communications Modem and their new database, service CompuNet, initially available only to Commodore 64 users. The first year's subscription to CompuNet is free with the purchase of the Commodore Modem, which costs £19.99.



## New modems

Given this data, PIC has developed a modem which it claims to be even cheaper and, as they claim, at £19.99, is less expensive than any equivalent equipment. The modem will, under its promise to

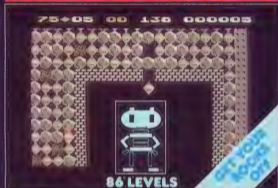
design and to integrate together. It is to be marketed by Prose Computing Services who have worked closely with Ciba on its development and have produced a range of interface parts to make the modem

compatible with two personal computers on the market including the Commodore 64. Ciba and Prose are predicting massive sales of 12 million over the next 18 months.

Ciba Holdings PLC can be

contacted at Park Lane, Brook House, Hinx, 1700, 1702, Telephone: 0992 441711.

# BIGGER, BOULDER, <sup>More</sup> BEAUTIFUL AMERICAN NO.1.



Boulder Dash

commodore  
64



**CASSETTE 8-95**

**DISK 10-95**



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Bessmer Drive, Stevenage,  
Hertfordshire SG1 2DN  
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the HORROR of the ANTS...

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And their nests in their homes  
Ants from their exclusive occupation  
of more before



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

Turbo Quad Commodore 64

**£8.95**

available from

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WISNITH   



Whether your forte  
lies in preaching or  
prebbling, asking or  
abusing, here's your  
chance to air your  
views or pass on any  
useful hints and tips  
to fellow Commodore  
users.

Dear Sir,

All those Commodore 64 users who I think got their minds too  
to work, don't take the  
computer back to the shop.  
There is nothing wrong with  
the manual is wrong. Go pair  
the the answers for your  
is (C64) and not (C65)

Here's another tip for you  
of your P04/64/125 (C-115  
P05). You will spend up the  
course and is very useful when  
editing long lists  
William Fong,  
London

Dear Sir,

In reply to Jerry Hunt, Glasgow  
- October issue, I also have a  
Commodore and Brother 1002  
word printer. It's just find it  
useful to remember the interface  
I have found most suitable is  
the base for the VIC 20/64/125  
all from Stark Computer  
Systems Ltd, 20/20a Derby  
Road, Soles, Liverpool, L26  
8LM. Also, the data for the  
may be used correctly.

Computer and pen

Printer and pen

The most reliable commands  
found to date are

Take a letter

OPEN 222 CH820=CH820.

END

HT 4.8 (also 48 lines)

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HT -21.5 (no)



A.P. and D.J.

Stephenson explore

Instructions and

Addressing modes in  
the third part of this  
series on machine

code.

ONE COMMENT ORDER TO the microprocessor is called an instruction. The 6504 has a repertoire, called the instruction set, of almost 60 different types but, because most of them are available in several different forms, the total number of permutations rises to several hundred. Each one has a number to choose from, can be recognised by the microprocessor, because of this, and that governing the last repertoire in this stage would be more confusing than helpful. Fortunately, only a relatively small proportion of the total number are in regular use. In fact, it is possible to begin writing workable machine code programs by restricting the repertoire to twenty or so instructions.

## The instruction format

A machine code instruction represents one complete order to the microprocessor and normally consists of two

parts, a verb but no noun so is incomplete. These are normally two parts of a machine code instruction, the operation code and the operand.

## The operation code

This corresponds to the verb because it tells the microprocessor what particular action is required. In general the op-code can be a decimal number, a pair of hex digits or, if you have an assembler, a three-letter group known as an instruction mnemonic. Every instruction has a unique code number. Unless you have additional software aids, the only way to enter an op-code on the Commodore 64 is by picking a decimal number. This is an awful method because decimals and machine codes are alien to each other. Machine code programming is not the easiest of subjects and if we have to work entirely in decimal op-codes, the task

## The operand

This is the second part of the instruction, corresponding to the noun. It informs the microprocessor where the data to be acted upon can be found. The operand, in most cases, will be the address of the data. These are, however, several different ways of specifying the address. They are known as addressing modes, because instructions may have as many as seven different addressing modes, whilst others may have only one. The operand can be specified in decimal or hex but, here again, hex addresses are much easier to work with.

## Simple addressing modes

The most commonly used instruction in the repertoire is LDA so we shall use it for illustration purposes where ever possible. LDA is an assembler mnemonic for Load Accumulator. It is used to place data into the accumulator, the whereabouts of the data is specified by the operand according to the addressing mode used. At this point, only three of these addressing modes will be discussed.

## Immediate addressing

Memory is not involved in using the operand specifies the data. This data will be specified by two hex digits (one byte) within the range 00 and FF.

Suppose we want to load the accumulator with the hex number 88 and we have an assembler required. The way in which the instruction is written depends on whether an assembler is used or whether you must use direct hex code. Both forms are given below.

Assembler	Hex code
LDA #88	49 06

Note that the assembler requires the character '#' to indicate the number is in hex and the character 'x' to indicate immediate addressing. In contrast, the hex code version is just two pairs of named hex digits. The first pair of hex digits is always the op-code. The opcode for LDA, using immediate addressing, is 49. Why 49? Because the designer of the 6504 decreed it to be so. Without an assembler, you must enter the hex digit pair for every op-code (and there are over 200 of them) or consult the full instruction set of the 6504. Perhaps this gloomy bit of information will act as a commercial break for the Assembler Commodore assembler, it is called immediate addressing because the data is immediately available in the operand. It is used when we want to load constants.

## Absolute addressing

When used if the data byte, to be loaded into the accumulator, is in memory — anywhere in the 64K RAM, the operand is a four hex digit number (two bytes) specifying the memory address. You will remember that any address in the 64K memory map can be expressed with the aid of four hex digits. Suppose we wish to load the data byte, residing at address C204 hex, into the accumulator. The assembler and hex code instruction become:

Assembler	Hex code
LDA C204	AD 06 20 C2

Notice that the hex address is now AD instead of 49. Hence also the strange reversal of the two operand bytes in the hex code version. This is standard rule when using 16-bit hex code so we had better emphasise it:

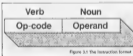


Figure 31 The instruction format

doesn't parts as shown in Figure 31.

As in everyday speech, any order given is a perfect context of two parts, the verb (what particular action is required) and the noun (which particular object is to receive the action). For example, suppose we cannot remember to lock the door. It is confused because, although he knows how to lock, he has not been told which particular individual or object requires locking. In other words, the instruction

lacks the noun. The door must still not attempt to use decimal op-codes at all. As mentioned in Part 1 of this series, if you intend to take machine code programming seriously, you are strongly advised to get hold of an assembler as soon as you can. However, for the benefit of readers who feel that the extra expense is not justified, a sample program will be given later, enabling all machine code programs to be entered in hex instead of decimal digits.

If direct hex code is used without an assembler, all two-byte operand addresses must be entered in reverse order, low-byte first, high-byte last.

This is important enough to justify an extra example: the hex address 3473 must be entered as 73 34. The registers of the system, divided as the address into low and high bytes, are more efficient organization of the address bus. In machine code, the human is relatively unimportant in considerations of "user friendliness" and second place to hardware efficiency. As can be seen at the example above, an assembler is a little harder towards humans and the two operand bytes are entered in normal sequence.

### Zero-page addressing

If the address of the required data happens to be on page zero (0000 to 00FF) it is possible, in fact it is a normally situation, to use page zero addressing. It is made efficient because the two leading zeros can be dropped, allowing a single byte operand to be used. For example, to load the accumulator with the contents of the hex address 05, the assembler and hex code with address would be:

Assembler: `LDX zero, 05`  
Hex code: `45 05`

We shall see later that page zero is very important because

up two of the three stack addressing modes on vector on data resident in page zero. In data retrieval, it refers from page zero that both stack areas of memory.

Unfortunately, most of page zero has already been occupied by the resident operating system so there are very few vacant address locations left for the machine code programmer. In view of this, those who wish should be given 512 slots and not used wastefully. We be very, although we can find no confidence in Commodore manuals to that.

10th Assembly of page zero  
0000 to 01 FF address

### Indexed and indirect addressing

These addressing modes are too hard to understand and will be discussed in detail later

in this series. However, for the sake of completeness, brief definitions are given below but, if you are completely new to machine code, don't worry too much about them yet.

### Indexed addressing with LDA

The contents of one of the seven registers is automatically added to the operand and the result is the address of the required data byte. Thus the same instruction can be used to access different addresses by simply adding the contents of the index register. There are three possible forms:

(a) Zero-page indexed, where only the X register can be used. For Assembly: expected, where either the Y or X register can be used. Assembler and hex code follows, using arbitrary addresses, are as follows:

Address: zero	Assembler	Hex code
Zero page 5	<code>LDX zero, 05</code>	<code>8D 05</code>
Address 4	<code>LDA 04, 04</code>	<code>8D 04 04</code>
Address 47	<code>LDA 04, 47</code>	<code>8D 04 47</code>

Using the same is used to obtain the addresses that indexed addressing is required.

### Indexed indirect addressing

An indexed address is the address of an address. It is not so bad as it sounds, involving we first neglect the indexing by assuming that X for that appropriate contains zero. The operand is the low-byte address (which must be in page zero) of a two byte address pointer. The high byte of the pointer is irrelevant sequential locations. As a preliminary example, using standard assembler notation, assume we use LDA 0405, assuming that address 04 contains 05 and the low-byte of the pointer and then into higher address contains 0C0 (the high-byte of the pointer). The effect of the instruction is to load the accumulator with the contents of address 5C05. However there are a little more complex with the effect of the index register is taken into consideration. Suppose X contains the number 3 and we add with LDA 0405. The low-byte address is now changed to 0408 and so an indirect address pointer is effective.

The advantage is flexibility. The same instruction can be

used to access different data items easily by varying either the address pointer or the index register. Assembly format and hex coding, using arbitrary addresses, is as follows:

Assembler: `LDX zero, 04`  
Hex code: `8D 04 04`

### Indirect indexed addressing

This is similar in general principle to indexed indirect. The essential difference being in the way indexing is used. Firstly, only X can be used for indexing. Secondly, the contents of X is added to the address pointer, rather than to the operand. An example should illustrate the difference using standard assembler

predefined (because the index was added first).

### How to enter a machine code program

Up to this point, we have only used the limitation LDA to illustrate the techniques of machine code and readers may be wondering how much longer they must wait before the rest of them are discussed. The trouble with machine code is that the various addressing modes are far more difficult to understand than differences between the instructions themselves. We have tackled the hardest part first. As we subsequently deal the other instructions, their programs requests will be given to illustrate the differences at each. However, before we go any further, we must know how to enter a machine code program and afterwards, how to load the program into the first instance that you do not have an assembler. Program 1.1 is a simple way to enter a program into the safe area of memory which, you may remember from Part 1 of the series, is the 4K block starting at address 8C00.

The program, written in BASIC, allows you to enter two machine code bytes in the form of 0414, separated by a space. You should type the program and load it on tape or disk for use whenever you want to load machine code. The two bytes shown are, of course, only an example so, once you have typed it in error, there is no need to wait lines 140 to 160 when you load your own programs, or some of the examples which will appear throughout the series, you will have to enter the bytes in the form shown in lines 140 onwards. Once you have entered the bytes and the BASIC program has stored the content, it is a simple matter to change the number of bytes used. In the example, there are 11 bytes. Once you have entered the number of bytes, the program will place them in memory starting at 8C00. It will be quite up to you to ensure that the 0414 bytes, which we shall refer to as a "hex dump", are entered in the correct sequence. You will notice that the data bytes in the example are placed in groups of eight. This is for convenience they are easy to count up if you look at the memory and also because it is customary in machine code memory to display the bytes in groups of eight.

Indirect indexed addressing is used much more often than indexed indirect. Here we have it is to get mixed up with the position of the assembler brackets. Let's put them together to emphasize the difference.

Assembler: `LDX zero, 04`  
Hex code: `8D 04 04`

Indexed address	04
04 05	
Indirect address	04
04 05	

It is worth mentioning that the older forms were as follows: Indirect indirect was called page indexing (because the index was added afterwards). Indirect indexed was called

```

10 REM POKING A HEX DUMP INTO MEMORY
20 REM STARTING AT ADDRESS $C000
30 INPUT "HOW MANY BYTES IN HEX DUMP?";N
40 B=40952
50 FOR L=0 TO N-1
60 READ D$
70 FDS=ASC(D$)-48
80 SD$=ASC(RIGHT$(D$,1))-48
90 IF FDS>9 THEN FDS=FDS-7
100 IF SDS>9 THEN SDS=SDS-7
110 B72=B+FDS+SDS
120 POKE B+L,B72
130 NEXT
140 DATA A9,00,05,FB,A9,05,05,FC
150 DATA A9,40,20,CA,F1,30,AD,FB
160 DATA E7,01,05,FB,90,02,06,FC
170 DATA A5,FB,90,EC,AD,FC,D5,EB
180 DATA 60

```

Program 3.1 Poking a hex dump into memory

LDY. On the other hand, STA has as many addressing modes as LDA, with the exception of the indirect one mode. A worded thought should convince you that it is impossible to have immediate mode with any store-type instruction. There is only one option to you: you can't specify both the data and where to put it in one single instruction.

### Exercises

To continue Part 3, here are some exercises which should help you to become familiar with some of the more simple addressing modes. In each program, enter it with the aid of the loader (Program 3.2), run it under the 40952, and see if it behaves.

1. Display a character of your own choice in the middle of the screen.
2. Display two different characters, one in a line, in the middle of the screen.
3. Display your name across the bottom of the screen.

### Running a machine code program

Program 3.1 is purely a loading program. When you run it, it merely loads the machine code into memory — it does not execute the machine code! To execute the code, you should now enter:

\$YS 40952

This directs the computer to start executing the bytes, and after the other, starting at the address \$40952. This is, of course, \$C000. If you have entered Program 3.1 in a console, including the example 20 bytes, you should confirm that the machine code, when run under \$YS 40952, will completely fill the screen with left characters. In fact, most of them will disappear but the last 24 will naturally cause the screen to scroll. Don't worry at this stage about how the machine code works. If you are a complete new comer, it would be very surprising if you did since several facts have been said which have not yet been explained. You should notice however that the last byte is hex 60 which is the machine code version of RTT. OK, these instructions most of your program will end in this code so that on a smooth re-entry to BASIC command level after the machine code program has stopped.

The example program works directly you run it but

some machine code programs require some extra data before they can be run. In such cases, it will be up to you to POKE such data into the correct memory locations before entering \$YS 40952. It should be mentioned here that it is not mandatory to always load other than of the machine code bytes. After all, there is it available so there is nothing to stop you loading your program in the middle of the block. However, there is no actual incoming original just for its own sake. If you get into the habit of loading at \$C000 onwards, there is less chance of making a mistake. It also allows you plenty of room at the start of the program to store any extra data required.

### LDX and LDY

These load the contents of the chosen index register in 8-bit data defined by the operand.

### STX and STY

These store the contents of the chosen index register in the memory address defined by the operand.

### STA

This stores the contents of the accumulator in memory at the address defined by the operand.

The addressing modes available, together with assembler and hex coding are

given in the following table using X to represent a single operand byte.

	Assembler	Hex code
Load X	LDX #hex	A2 xx
	LDX \$X	A6 xx
	LDX (hex)	A5 xx xx
	LDX \$X,Y	95 xx xx
Load Y	LDY #hex	A3 xx
	LDY \$X	A7 xx
	LDY (hex)	A4 xx xx
	LDY \$X,Y	94 xx xx
Store X	STX hex	86 xx
	STX (hex)	85 xx xx
	STX \$X,Y	96 xx
Store Y	STY hex	87 xx
	STY (hex)	84 xx xx
	STY \$X,Y	97 xx
Store A	STA hex	8D xx
	STA (hex)	8C xx xx
	STA \$X,X	75 xx
	STA (hex),X	8D xx xx
	STA \$X,X,Y	9D xx xx
	STA (hex),Y	9D xx xx
	STA \$X,X	8F xx
	STA (hex),Y	9F xx

From what has been said already, it should be possible to figure out the name of each addressing mode in the table by simply examining the assembler format notes that some instructions have a limited addressing repertoire. For example, you can't use indirect addressing with LDX or

**Warning:** don't forget to count your bytes and make sure you input the right quantities and that you get subscripts or, sure as hell, you will make the system crash! will be given in Part 4.7.

# “dialog...”

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(Bankers and Accountants)

# ANA CONDA

Gather speed and momentum, and accumulate points, as you wind your way around the screen hitting the boxes and dollar signs which flash in your path with this rail-hitting game.

### Research Policy Forum

THE REASON THAT CAME TO  
TO SHOW YOU THAT it is  
a right and necessary action  
performed by an animal  
around the world using the  
following facts:

Adrian Douglas, *1995*  
 Edinburgh

As you work your way around the wheel, you score points by listing the bones which suddenly appear and to add to your frustration, frequently, disappear before you can catch them, the number of

points you will depend on the number of points likely inside the box you provide. Accordingly, you can score bonus points by listing 5 signs that have points as well as one each in your water area you feel confident about. The number of bonus points scored depends on the length of your answer.

which grows in the game program, but actually grows since the "legs" has been disconnected. The longer your "snake", the more you digress. You're bound as I can tell to continue yourself in a state of snake. The game ends when you hit the boundary or have back to yourself.

## References

[illegible]



## 01-430 0954

<b>Business accounts</b>	
Sales Ledger (Managint) d	75.80
Purchase Ledger (Managint) d	75.80
Rat or Ledger (Managint) i	14.80
Purchase Ledger (Managint)	14.80
Account's passage (Managint) d,i	715.80
Cashbook (Balanstemples) d	172.80
Cashbook (German) d	64.80
Cashbook (German) i	69.80
Final Accounts (German) d	64.80
Final Accounts (German) i	69.80
Inventory 64 (MMS) d	70.80
Stock Control (German) d	24.80
Stock Control (German) i	10.80
Goods recd Stock No. 5 (German) d	69.80
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Budgeteer (Adamsch) i	8.80
Checkbook Manager (Adamsch) d	14.80
Home Accounts (German) d	24.80
Home Accounts (German) i	70.80
Home Office (Rudolph) d	14.80
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**Abstract**

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**Figure 1**

4. *Illegale* - a person who is not a citizen of the United States and is not a permanent resident of the United States.

In the third part of this series, Ryan Phillips invites you to initiate the neighbours by adding sound to your VIC games.

# VIC GAMES PROGRAMMING

THIS IS THE THIRD OF A FIVE part series of BASIC Games Programming for the VIC-20. The series is primarily intended for newcomers to games programming, but there might well be a few useful tips for seasoned programmers.

As far as we're looked at two of the main elements of Games Programming on the VIC-20 — screen layout and movement. Even without sound you can write some good games. In fact some games are better with the minimum of sound — especially thinking games — it can be a distraction. However for most action games imaginative use of sound can make all the difference. As a VIC owner you have a big advantage in this area, because the sound comes through the TV speakers, giving you lots of sound. That's not like listening to the odd perfect blorp or honk, either — you have an amazing variety of sound effects to draw on.

## Tuning into the VIC

The VIC has two sound registers, four for tone, and one for volume. As with most things on the VIC you have to poke values into these registers, which have the following memory locations:

	Register Location	Range
Volume	\$D070	0-255
Tone 0	\$D071	0-255
Tone 1	\$D072	0-255
Tone 2	\$D073	0-255
Tone 3	\$D074	0-255

In order to use sound effectively in Games Programming it must be carefully planned, and not just tacked on somewhere at the end of the program as an afterthought. There are three ways of using sound. It can be put in in discrete packages, or carefully integrated into the program structure.

One of the most valuable uses of sound in a program is to add interest or excitement when there is no action for example the introduction,

or where there is a distinct pause in the action that would occur when something spectacular happens, for example an explosion, a ship sinking, or a bomb scare message. Here you can usually get the sound in as a discrete package in a subroutine, and allow your main programming, and often your co-players, to go on with some sophisticated effects. Sometimes you might want to play a few bars of a tune. This is easily done by going to a subroutine along the lines shown in fig 1(a).

```
100 FOR V=1 TO 10
200 FOR T=1 TO 10
300 POK $D070,V
400 FOR J=1 TO 200: NEXT J
500 NEXT T
600 POK $D070,$D070
```

fig 1(a)

Where V is the volume register, and the loop (J) contains the notes of the tune, where you define earlier in the program. This sounds a bit flat though, and you can make it more interesting by introducing the sound to a few different effects. The simplest is to pass a list, and this is done by decoding the volume as outlined in fig 1(b).

```
10 FOR V=1 TO 10
20 FOR T=1 TO 200: NEXT T
30 POK $D070,V: POK $D071,V
40 GOTO 100
50 NEXT T
60 POK $D070,$D070
```

fig 1(b)

## Hitting the right note

All you need to do now is to find the notes in your tune. Rather than constantly refer to the table of note values in the User's Manual, it's far easier to use a utility program to help you compose the tune. The utility program, COMPOSE-POKE (Listing 1), allows you to compose short tunes (20 notes max), and provides you with the values to include in the data statements in your program.



It's very easy to use: you just use the bottom row of keys of the keyboard as the white notes, and the second row of keys as the black notes. Any other keys will give you a single note pause. You can easily change the tune using doors, and flip it back at any time using F1. The program is considerably simple. Without too much effort you could convert your VIC into a real little sound synthesiser, with chords, drums, and maracas. But that would be getting away from Games Programming — it would eat up valuable memory, and we need that for other things.

## Effecting sound

Now let's get on to the sound effects. Probably one of the first things you did when you acquired your VIC-20 was to write in some of the sound effects at the back of the manual. Some of them are very good, and they crop up from time to time in programs here and there. It's tempting to leave it at that — as I said some of them are very good. Unfortunately they're not original — they were thought up by someone else. If you're writing your own programs you need your own sound effects which exactly fit your theme, whether it's ducks quacking, tyres screeching, or alien screams.

Fig. 1(c) is up to you.

Most simple sound effects are generated by nested loops. Fig 1(c) shows the two simplest loops.

```
10 FOR I=1 TO 80
20 FOR N=1 TO 10: NEXT N
30 FOR V=1 TO 255: NEXT V
40 POK $D070,V
50 POK $D071,V
60 NEXT I
70 FOR I=1 TO 100: NEXT I
80 NEXT V
90 NEXT I
100 POK $D070,$D070
```

LOOP 1

```
10 FOR I=1 TO 80
20 FOR V=1 TO 255: NEXT V
30 FOR N=1 TO 10: NEXT N
40 POK $D070,V
50 POK $D071,V
60 NEXT I
70 FOR I=1 TO 100: NEXT I
80 NEXT V
90 NEXT I
100 POK $D070,$D070
```

LOOP 2

fig 1(c)

In Loop 1 the volume loop is nested within the tone loop, and in Loop 2 the tone loop is nested within the volume loop. Loop 1 can be used to give some pleasant musical effects, and Loop 2 really comes into its own for those weird alien sound effects we



Have all learned to love for  
himself. If you type in the utility  
program "SASMAC" (which is  
free), I think you can play  
with these tools to your heart's  
content, and when you get an  
effect you like just copy, paste  
for values the numbers into the  
code given in my post. I've made  
up a table of some values you  
might like to try when you start  
it, but whether you agree with  
my descriptions of these  
tools is another matter!

helps if you want to  
understand the

### Integration around

Likewise in this article I mentioned integrated sound. The only problem of going to a subwoofer with built-in speakers is that it does down the action. For example, it can make the whole thing worse if the sound only

**Sold a note.** You have to live with your program. Hence, search out your most efficient sub-program and merge the two. The speed of the algorithm *must* not change when the amount of data grows — you will just get a slight reduction in the overall speed. The money captures the effect the greater the reduction. The answer is not to go overboard with the integrated neural efforts — send them inside. You can

programs a ball bounces around the screen, and plays each time it hits the edge. In **MOUSE-1** A test program goes to a subroutine to generate the sound, and in **MOUSE-2** it's sound is integrated. It's a very simple example, but if you think the two programs you should make the difference.

So if you've been talking about stairs, frigs, run belts etc. and all we've got is the VHS standard program set, it's possible you got a lot of imagination you are probably quite happy with that — but it does take a lot. A square falling from a rectangle can be interpreted as a bomb falling from a plane, but also as a real one would, being still in motion. That's what I'll be covering in the next article in this series. We'll discuss *Levi Deflowered* (Caphura, 1976) — they mean all sorts of things.

[illegible]

When you type in the program it's important to make sure you get the screen formatting right, but otherwise there should be no problems. Lines 5 and 2 have been included in the program as subroutines, and if you follow the listing through you will see that it's quite easy to add your own experiments.

occurs occasionally. In order to avoid this you have to integrate your sound effect into the structure of the program. This can take some thinking about, and will vary from program to program. The trick is to find a natural delay in your program structure, and insert the sound effect. Some sounds are

Like the sound extraneous for the jumps and clatters, as you stand the moment of victory, of laughter in defeat.

The difference between integrated board and the use of subsequence is shown in listing 3 and listing 4. Back to the bouncing ball featured on the last article, in both

100

[illegible]

```

1  # 1. 데이터 불러오기
2  # 2. 데이터 전처리
3  # 3. 모델 학습
4  # 4. 모델 평가
5  # 5. 모델 배포
6  # 6. 모델 모니터링
7  # 7. 모델 업데이트
8  # 8. 모델 삭제
9  # 9. 모델 백업
10 # 10. 모델 복구
11 # 11. 모델 테스트
12 # 12. 모델 검증
13 # 13. 모델 성능 평가
14 # 14. 모델 성능 모니터링
15 # 15. 모델 성능 개선
16 # 16. 모델 성능 최적화
17 # 17. 모델 성능 분석
18 # 18. 모델 성능 시각화
19 # 19. 모델 성능 리포트
20 # 20. 모델 성능 평가 결과
21 # 21. 모델 성능 평가 지표
22 # 22. 모델 성능 평가 방법
23 # 23. 모델 성능 평가 도구
24 # 24. 모델 성능 평가 프레임워크
25 # 25. 모델 성능 평가 라이브러리
26 # 26. 모델 성능 평가 패키지
27 # 27. 모델 성능 평가 모듈
28 # 28. 모델 성능 평가 클래스
29 # 29. 모델 성능 평가 함수
30 # 30. 모델 성능 평가 메서드
31 # 31. 모델 성능 평가 프로퍼티
32 # 32. 모델 성능 평가 속성
33 # 33. 모델 성능 평가 변수
34 # 34. 모델 성능 평가 파라미터
35 # 35. 모델 성능 평가 옵션
36 # 36. 모델 성능 평가 설정
37 # 37. 모델 성능 평가 구성
38 # 38. 모델 성능 평가 환경
39 # 39. 모델 성능 평가 컨텍스트
40 # 40. 모델 성능 평가 범위
41 # 41. 모델 성능 평가 대상
42 # 42. 모델 성능 평가 범위 설정
43 # 43. 모델 성능 평가 대상 설정
44 # 44. 모델 성능 평가 범위 및 대상 설정
45 # 45. 모델 성능 평가 범위 및 대상 설정 방법
46 # 46. 모델 성능 평가 범위 및 대상 설정 도구
47 # 47. 모델 성능 평가 범위 및 대상 설정 프레임워크
48 # 48. 모델 성능 평가 범위 및 대상 설정 라이브러리
49 # 49. 모델 성능 평가 범위 및 대상 설정 패키지
50 # 50. 모델 성능 평가 범위 및 대상 설정 모듈
51 # 51. 모델 성능 평가 범위 및 대상 설정 클래스
52 # 52. 모델 성능 평가 범위 및 대상 설정 함수
53 # 53. 모델 성능 평가 범위 및 대상 설정 메서드
54 # 54. 모델 성능 평가 범위 및 대상 설정 프로퍼티
55 # 55. 모델 성능 평가 범위 및 대상 설정 속성
56 # 56. 모델 성능 평가 범위 및 대상 설정 변수
57 # 57. 모델 성능 평가 범위 및 대상 설정 파라미터
58 # 58. 모델 성능 평가 범위 및 대상 설정 옵션
59 # 59. 모델 성능 평가 범위 및 대상 설정 설정
60 # 60. 모델 성능 평가 범위 및 대상 설정 구성
61 # 61. 모델 성능 평가 범위 및 대상 설정 환경
62 # 62. 모델 성능 평가 범위 및 대상 설정 컨텍스트
63 # 63. 모델 성능 평가 범위 및 대상 설정 범위
64 # 64. 모델 성능 평가 범위 및 대상 설정 대상
65 # 65. 모델 성능 평가 범위 및 대상 설정 범위 및 대상
66 # 66. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정
67 # 67. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 방법
68 # 68. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 도구
69 # 69. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 프레임워크
70 # 70. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 라이브러리
71 # 71. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 패키지
72 # 72. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 모듈
73 # 73. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 클래스
74 # 74. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 함수
75 # 75. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 메서드
76 # 76. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 프로퍼티
77 # 77. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 속성
78 # 78. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 변수
79 # 79. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 파라미터
80 # 80. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 옵션
81 # 81. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 설정
82 # 82. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 구성
83 # 83. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 환경
84 # 84. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 컨텍스트
85 # 85. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 범위
86 # 86. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 대상
87 # 87. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 범위 및 대상
88 # 88. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 범위 및 대상 설정
89 # 89. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 범위 및 대상 설정 방법
90 # 90. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 범위 및 대상 설정 도구
91 # 91. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 범위 및 대상 설정 프레임워크
92 # 92. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 범위 및 대상 설정 라이브러리
93 # 93. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 범위 및 대상 설정 패키지
94 # 94. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 범위 및 대상 설정 모듈
95 # 95. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 범위 및 대상 설정 클래스
96 # 96. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 범위 및 대상 설정 함수
97 # 97. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 범위 및 대상 설정 메서드
98 # 98. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 범위 및 대상 설정 프로퍼티
99 # 99. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 범위 및 대상 설정 속성
100 # 100. 모델 성능 평가 범위 및 대상 설정 범위 및 대상 설정 범위 및 대상 설정 변수

```

## Wednesday 22

[illegible]

```

1  #include <iostream>
2  using namespace std;
3  int main()
4  {
5      int a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u,v,w,x,y,z;
6      a=1;b=2;c=3;d=4;e=5;f=6;g=7;h=8;i=9;j=10;k=11;l=12;m=13;n=14;o=15;p=16;q=17;r=18;s=19;t=20;
7      u=21;v=22;w=23;x=24;y=25;z=26;
8      cout<<"a-z: ";
9      for(int i=a;i<=z;i++)
10         cout<<i<<" ";
11      cout<<endl;
12      return 0;
13  }

```

[illegible][illegible]

**Mike Roberts and  
Simon Rockman  
investigate the smaller  
offspring, the  
Commodore 16.**

# 16:

## COMMODORE'S LATEST NUMBER

THE COMMODORE 16 is packaged in the same type of box that has pleased Commodore 64 and VICs for the past few years. The much-loved colour screen is rather different to the C64's, it calls for a negative or gammaless box and a grey keyboard.

On the ports at the back of the box there is a departure from the 64/VIC style with the omission of the RS232C interface and the parallel user port.

Most retaining features have been changed: the cartridge expansion port has been reduced in size to stop people shoving C6464 cartridges into a C16. Commodore say that no RAM memory expansion is into this lot, only cartridges, although 'Memory Expansion' is written about it. Commodore's answer is 'We know'; apparently the moulding was made by a Chairman or something. It is unknown whether the highly admired structure of the C64 64's slot is duplicated with the facility for second processor etc.

The two DB connectors of the C64 64 have been dispensed with and replaced with one DIN connector. This means you can only use Commodore's keyboard, but even that new 'Besp' style ones are not the best on the market. This is looking worse if it is so easy to make an adaptor for use with any keyboard. No doubt there will be a timing issue in adaptors. There is also one other problem in its products, on the box they are labelled 'PORT B' and 'PORT 1' - BASIC thinks they are 'IOB' (I?) and 'IOV' (V?) — the expensive Chairman prefaces.

The cassette recorder/pocket is also a mini DB connector: this is because the C16 cassette deck is different to C15 tape drives. This doesn't really matter with the C16 as a cassette deck port supplied with the computer.

There is, of course, Commodore's name on the front but, and the sub-processor connector along since all Commodore's existing peripherals which use these ports will work straight off, there are already printers and disc drives available for the machine; this is a welcome change from the usual state of affairs where the user has to wait up to two years for any peripherals at all.

The keyboard is up to Commodore's usual excellent standards and probably represents most of the component cost of the machine (it is on the C6464 and VIC). Changes made from the VIC/64 keyboard include two separate cursor keys, an escape key, and various modifications to the layout of the keys to fit case those changes. The cursor keys are now on the top right of the keyboard. This is disturbing to a user who is experienced with the Commodore keyboard as it is, but it is extremely logical and easy to get used to for the first time user.

### Inside the C16

The internal hardware reveals some surprises. Most of the inside is driven via one big chip called either the 7801 or the 7802 (this depending on your inclination, it combines a 6401 processor with 256K of static RAM, a 6402 processor, a 6403 processor, and a 6404 processor). In all it has 19 registers to control things in order of graphics ability: the

Sprite has 5, MSX has 6, the 80C has 17, the Commodore 64 has 40.

Sound ability is as good as any other computer although it only has two channels — either two sound channels or one sound and one noise (for special effects). Nearly all the advanced sound features of the 64-bit processor have left out like ADPCM, filtering, and modulation.

Graphics ability is exactly as a standard that the 64 and the MSX had for comparison with the Commodore 64 as there are a lot of similarities in spec, the graphics are different and there are currently two schools of thought as to which is better, the C6464 or the C16.

### No sprites...

The big difference lies with sprites. There is no wonder that this feature is missing, as it may have been dropped from the C16. In their place is a software emulation of them from BASIC while you can emulate an array of the screen and store it in a string. This string can then be copied and put back on the screen at any point. There are also other options to manipulate these objects, but they are not true sprites, a large 128 byte object takes about a quarter of a second to write to the screen. I feel that the world can live without sprites for at least another computer generation (about 18 months); the Commodore 64 and 64+ were not too far ahead of their time.

### ...But more colour

The trade-off against the speed is more colour. The screen of the C16 can have 128 colours (121 excluding black) made up of 16 colours, 8 horizontal lines, and 16 vertical lines. Screen size is 40 x 25 text with four other graphics modes. The other graphics modes are 320 x 200 with the previously mentioned 128 colours being used in a colour map system, and 320 x 200 in a 16-colour mode. Both have screens have an option to have four text lines at the bottom of the screen. There are some other graphics modes and options but these are only available by PORTing. LDCs are obtained by PORTing and change about all registers.

The manual gives no hint of these although they are very strong forward to colour text playing with a DCA one either feature becomes apparent. A character pointer is 2K long (256 x 8 bytes). The C16 one is only 1K long. How come? Well, the one and that of it is that the C16 uses a hardware memory field address. The top bit of the current character displayed indicates whether it is inverted or not. The advantage of this is in memory consumption. The character table is that you can only have 128 LDCs, and 128 LDCs means it is a rather strange way. A reverse field switch is shown in a block screen when you load it instead of getting a 'flashing screen' nothing happens. This quite confusing until you



means that a floating space doesn't change.

Other modes and demonstrations include Extended Background Colour mode, which gives you 4096m background colours as well as foreground colours, and multicolour characters when each character can be made up out of a number of colours. There may be others but without a technical manual, I cannot mention them.

### Programming the C16

While investigating the ROMs in the machine I came across a strange quirk. Before getting the manual, I was poking the top end of ROMs to discover the BASIC keywords. Doing this produced garbage and not the codes that I was expecting.

However, entering the monitor and interrupting Jiffyrom revealed that all the memory saving systems of the Plus II have been left on, so when you try to Plus the ROMs then BASIC jumps in and to allow access to the Basic ROMs. This is almost as a full Plus II but as a Mac C16 there is no memory there — just garbage.

This brings me to another point. The BASIC covered in the latter half of this article is good for an inexperienced user or an experienced BASIC user, but what about an machine code hacker and people that wouldn't use BASIC if they were paid for it?

The answer is ROMMON — a full feature assembler, disassembler, monitor, debugger. It is similar to Spectrum 2.0 and is very good

indeed. This makes writing assembly language very easy as you already have most of the

development software built in. Here is a list of monitor commands.

A	ASSEMBLE	Assemble a line of 6502 code
C	COMPARE	Compare two sections of memory and report differences
D	DISASSEMBLE	Disassemble a line of 6502 code
F	FILL	Fill memory with the specified byte
G	GO	Start execution at the specified address
H	HUNT	Hunt through memory for all occurrences of certain bytes
L	LOAD	Load a file from tape or disk
M	MEMORY	Step to the nearest real values of memory locations
R	RESET/RESET	Display the 6502 registers
S	SAVE	Save to tape or disk
T	TRANSFER	Transfer code from one section of memory to another
X	EXIT	Exit ROMMON





The touch for the old PETs had a great BASIC function. It's given the user that was being run and the last line was shown that in a row. The C-64 just prints out the line being executed at the current print position. This means that the screen gets cluttered with a load of line numbers and almost one what is supposed to be going on. It is smoothed out with PRGM and off with BASIC.

## Disk handling

BASIC 4.0 programmers will be familiar with all these commands.

BASIC 4.0 provides a fast backup command drives on a disk drive unit. The only way of using this is with a 4040 B050 type drive and an interface were the 1642 is only a single drive. There may be a disk drive in the printer, one was purchased in Commodore's recent releases.

DIRECTORY shows the contents of a disk without disturbing any BASIC program in memory. There is no DATA command as used in BASIC 4.0.

DELETE and NAME load and save files from and to the 4040 disk format. A new disk there are two ways of doing this, a full 4040 disk which contains the whole of it and a quick 4040 disk which just formats over the directory on a disk which has already been used. The former is probably not since it means the whole disk is safe to use and there are no bad sectors. REFORMAT does just that, it's a slow the same of a

file to be changed on the disk and used for archiving a file, are working on.

COPY is slower than backup for copying a whole disk and does not format the disk or copy up data but it is more like a selection of files.

CHMOD, the disk handling commands are a very useful add-on for disk users - but how many people will spend 1.00 on a disk drive for a 4040 computer seems to be slow.

## Graphics

By far the greatest improvement in Commodore BASIC has occurred in the field of graphic commands. The use of high resolution graphics now, a resolution, the memory, is high resolution the user is not to work with. Commodore mode could not be a but for most users will want to use BASIC.

The non-high res command is COLOR. This replaces the many POKING there are three parameters to this command type, colour and brightness. The type is a number between 0 and 4.

- 0 - Background
- 1 - Character Ink
- 2 - main colour
- 3 - main colour 2
- 4 - border

To use the high resolution graphics there is the GRAPH command. This allows for two modes, a 160 by 100 mode where the colour resolution is limited to two colours per 84 pixels and a high colour mode where a low four colours per 84 pixels. There is an opt on to

change the graphic mode as you go. The graphics screen can be cleared with the CLEAR command. The DRAW command will either draw from the last point or from and to a specified point. The colour can be given for each line. One of the major problems with a graph is screen is the difficulty of drawing first to a drawing, it is why most can be very tedious. The C-64 has two ways of overcoming this. The first is a fast window at the bottom of the screen which can be printed to and which is only a small area. The second is the CHAN command. This either writes or erases a point string at a specified position in a block but allows the string to be put anywhere on the graphics screen. The BGR command is a fast alternative to using four store commands, it is possible to print a whole screen related to the C-64 command is a very small but many up for that it is to five bytes. It can be used to draw any polygon or oval. Colour fill is quite difficult to do but that is no problem on the C-64 which has a POINT instruction. The 16 colours make the C-64 a very pretty machine.

An attempt to make a pointer has been made for the inclusion of the commands CHAN and DRAW. There was a graph in the screen and a string which can then be printed back into a different part of the screen. There are then the different logical operations which can be used to produce different effects when representing the software update.

## Sound

Sound on the C-64 is a mode which compares to the 64. This is partly due to the new BASIC command and partly due to the lack of limit on. There are only two commands, VOX and NOISE. These are two musical voices and one noise channel. The parameters for VOX allow the voice number, the note and the duration. It won't be slow before we start to hear the standard typing sound.

## Final points

The manual is excellent and easy just Commodore's standard. It is information and manual for the user and for the experienced person there are memory maps and register data.

As only 16K the C-64 loses a bit on the disk side, especially as the system runs on 4K for the operating system and screen. This leaves you with 12K for programs. This is not too bad considering that Commodore machines are very frugal in memory consumption.

Finally, another 16K draughter when using basic graphics, this leaves only 2K for the user. Through clever programming, as the 2K can be extracted from the memory making a grand total of 40K.

All we can hope for is that memory expansion with personal available as soon as possible, it was from Commodore then from third party manufacturers.

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## Getting into a loop

over BASIC? Then

follow A P and D J

Stephenson's advice

on conditional

processes and loops in

the third part of this

series.

THE POPULAR PRESS is fond of employing test comparisons. In some way or another, from electronic 'beams' and that they work things-out for us, that in formal media publish. Computers don't know how to work anything out, they do exactly what they are told and nothing else. If a human doesn't know how to solve a problem, then so computers, however much it might be easy, can solve it, but only if every problem is solvable. In theory, eventually be solved by some form of trial and error process but this is not really solving the problem — it is just laboriously eliminating the methods which won't solve it. Fortunately, the computer works to much faster than humans that even trial and error method are often practical, even if it involves waiting through millions of incorrect answers before they hit, by chance, on the right one. Perhaps it is this which is partly responsible for the myth that computers have 'intelligence'. Nevertheless, there is one statement in the BASIC vocabulary which, superficially, appears to induce the computer with some intelligence. This is the IF/THEN statement because it appears that the computer is capable of making a decision (in reality the computer doesn't make the decision on its all but it seems as if it does). The format of the statement is as follows, if condition THEN action

```
Example
IF A > 20 THEN 100
This condition is 'A > 20'
```

The action implies 'GOTO line 100 for the next instructions'. Whenever the action is carried out or not depends entirely on the truth or falsity of the condition. If it is true, the action after the THEN part is obeyed. If false, the action is ignored and the program continues with the

# THE BASIC FACTSPT. 3



next line number (if using the IF statement). In the example above, if A was indeed 20, the computer would go to line 100, but if it was not 20, the program would simply carry on to the next line instead of jumping to 100. It is important to point out that the particular action to be executed if the condition is true is not necessarily a simple jump to a line number. There are some examples of legitimate IF statements:

```
IF A, B = 20 THEN B = B+1
```

If the condition is true, the action is a simple increment action on B

```
IF (B > 0) THEN 10 THEN B = B+1
```

```
IF A = 20 GOTO 20
```

Notice here that the word 'Then' can be missed out and replaced by GOTO if the action is a jump to line number:

```
IF (B = 0) THEN B = B+1 PRINT B
```

Notice here that the action can be extended to more than one statement providing the usual colon delimiter is used to separate them. The rule is that all statements which follow the IF part and which belong to the same line number are executed if the condition is true. If the condition is false, none of them are executed and the program continues at the next line number.

It is clear from all this that although the IF statement appears to make a decision, it is not a decision in the

strictest sense. A true decision is based on a judgement formed after considering the relative merits of alternative solutions to a problem. The computer is not making a decision at all, it has no option but to act on the value of a variable as it is at the moment, behaving according to directions given by human intelligence.

We are promised that the next level of computer man on the drawing board, will when in the so called fifth generation revolution, they will be able to have artificial intelligence (just as there is) means to be able to make the proper use of intelligence or merely an increase in memory processing ability. In the meantime it is comforting to rely on the following definition 'Intelligence is that which a computer does not have'.

It will at least preserve man's dignity for a bit longer.

## Repetition

A computer is ideally suited to carry out repetitive tasks. That is to say, an identical process is carried out on a variable for a certain number of times. Although the process is identical, it is clear that something must change during each repetition or nothing much would be achieved. The following terms, relating to repetitive tasks, are well understood:

(a) Loop, the general name for a set of instructions as in 20. Cycle, one complete process

(b) The loop variable, the particular variable which is changed during each cycle

(c) The increment, the amount by which the loop variable is changed each time. It can be either positive or negative. For example, the increment could be +1, meaning the variable is increased by 1 or -1, meaning the variable is decreased by 1, within each cycle.

(d) The starting value, the value given to the variable on entering the loop.

(e) The ending value, the final value required of the loop variable. When the loop variable has reached this value, the repetitive process is complete and the program is arranged to come out of the loop.

In an example, to illustrate the meaning of these terms, suppose we want the variable A to grow, one at a time, from 10 to 20. We can a loop, then A is the loop variable, 10 is the starting value, 20 is the finishing value and the increment is +1. As a further example, suppose B is to diminish from 100 to 100 by increments of 5. The loop variable is B, the starting value is 100, the finishing value is 10 and the increment is -5.



## Components of a loop

Before we start the points listed above, a loop will consist of the following components:

(a) Initialization: Preparing the loop for entering the loop. This will often be no more than a simple assignment for setting the starting value of the loop variable.



to the process. This could be very simple, such as simply printing out the value of the variable each time round the loop, or it could be a highly complex mathematical operation. It could even be a rearrangement of letters within a word. In fact the process could be almost anything, limited only by the imagination of the programmer. In some cases, loops are used merely to cause a delay somewhere within a program. For example, to display a screen message for an indefinite time for the operator to read it and decide the appropriate action. In fact, even the actual process is quite unimportant, providing the execution time is adjusted to be equal to the required delay.

It should be mentioned, however, that using a loop for causing a delay is not to be recommended. It is crude and, unless you know the execution time of the statements which form the process, a fair margin of error exists to the incrementation. The loop variable must be altered at some way ready for the next cycle. There is no hard and fast rule as to the position of the incrementing procedure, however, it was advantageous to increment before and sometimes after the

start of each process.

**2b) The end-of-loop-test.** Two examples of checks on the value of the loop variable. It is made each time round the loop to see if it has reached its finishing value. If it has not, the process is repeated. If not, the loop must be ended.

The following program programming examples will help you to become familiar with the forms.

```
Program 11
100 FOR
110 PRINT A
120 A=A+1
130 IF A > 20 GOTO 110
140 END
```

No spaces are made for the childish simplicity of the program. It is quite good enough to illustrate most of the points already made. The loop extends over the last, 110 to 130. Line 100 initializes the loop variable by a simple assignment statement. The process is simply to print out the value of A each time round (line 110) deal with the incrementation of the loop variable, the increment being +1 each time. Line 130 handles the end-of-loop test by directing the program back to the start of the

loop each time providing the value of the loop variable is remains under 20. When it has reached 20 the loop ends and the program stops. In short, the program prints out the numbers 1, 2, 3, . . . 20. To show that the same objective can be achieved differently, study the next program.

```
Program 12
100 A=1
110 A=A+1
120 PRINT A
130 IF A > 20 GOTO 110
140 END
```

The same, the incrementation has been carried out before the process but, to satisfy the same objective, the loop variable is initialized to 1. It may be asked, "which is the best way?" There is no straightforward answer to this since situations can arise where the second version is more convenient. However, the first version is easier to follow in a more logical, indeed, we can lay down the general rule that it there is more than one way of achieving the same result, always choose the one which is easier to follow, even if it happens to be a little less efficient and takes a longer time to execute, having a fine

margin tends here and there can sometimes be important but not very often. The simplicity of programs tends almost instinctively anyway (at least as far as humans are concerned). Although it has been written about using computer time, in the vast majority of programming applications, the advantages are often academic rather than practical. Armed with "cheat" tricks just to show you are clever, how can mark the temporary admission on a few programs but not for long. The watershed of good structure is a wire.

## Bugs in loops

When programming a loop, there are two areas in which bugs do like to sit.

1. Incorrect number of loops. It is very easy to be "one out" in the loop count. For instance, in both Programs 11 and 12, it is quite possible that the original question was to print out the value of A from line 20 instead of to 19. However, responsible for an incorrect loop count, can lead to either the introduction of the end-of-loop test.

by the endless loop. It is easy, in fact ridiculous, to fall into the endless loop trap instead of revolving round a certain number of times. The loop goes on for ever. In other words, the program is asked when the loop and can never escape to the rest of the program. The most common cause of the bug is a jump to an incorrect line. For example, in Programs 3.1 and 3.2, if the IF statement returned control to line 100 instead of 150, it would be easy to see that an endless



loop situation would exist because the effective increment is cancelled by reinitialisation each time. It would also happen if the end-of-loop test was searching for a number which could never be reached. For example, if we had the

```
100 IF A = 255 GOTO 100
```

it is evident that if the value of A is less than 255, the end of a loop would be marked so the increment is positive and the starting value is greater than the finishing value. As an endless loop will also exist if the increment is negative and the starting value is less than the finishing value. Unfortunately, the rate of loop bug is not always so easy to spot. If the loop is at all complex, it only requires a good deal of detective work and the occasional loss of control before the cure is found. Very often, during one last test run another, particularly if you have little confidence left regarding the program.

## The FOR/NEXT loop method

Although the previous method of organising a loop is quite satisfactory, the amount of BASIC code is long enough to provide us with a pair of statements which were intended to make life a lot easier. The FOR statement is used at the start of the loop and the NEXT statement marks the end of the loop. The purpose is so to indicate. Although the Commodore User Manual describes the use of the

FOR/NEXT loop structure, we will start from scratch to cover as many points of the points made. The format of the FOR statement is as follows.

FOR variable = starting value TO finishing value STEP increment

For example,

```
FOR A = 1 TO 20 STEP 1
```

This will loop a program which A will start at 1 and carry on until it reaches a value of 20, incrementing by 1 each time round the loop. The bottom of the loop is defined by the simple statement,

```
NEXT A
```

Here, then, the FOR statement does quite a lot of work. The rest of the instructions, incrementation and, naturally, any end-of-loop test all are done for you. To illustrate the elegance of the FOR loop and to see how it compares with program work, study the following.

Program 3.1  
100 FOR A = 1 TO 15 STEP 1  
110 PRINT A  
120 NEXT A



The net product of this results in the previous two programs — it prints out the value of A from 1 to 15 without it doing any more than the addition of the loop statement to be setting the loop. Also, it is achieved by less time spent because it follows the chance of being one out in the loop count.

It is important to be aware of the following features:

1. Whatever the parameters in the FOR statement, the loop will always proceed through once.
2. The value of the loop variable after leaving the loop is always the finishing value.

For example, in Program 3.1, although only the numbers 1 to 15 are printed out, the value of A after exit will be 16. If the increment is to be  $\pi$ , it is not necessary to include STEP 1. Thus, the FOR

statement in Program 3.1 could have been written in the more concise form,

```
100 FOR A = 1 TO 15
```

4. The loop variable must be floating point. We can't enter FOR A% etc.

5. The starting, finishing and increment values can be variable names or any legitimate expression. For example, the following FOR statements are all legal.

```
FOR A = B TO C STEP D  
FOR B = B+C-D TO B*D  
STEP 1/3  
FOR C = B*345 B TO  
NEXT A(1) STEP A(CD) A(D)  
FOR D = B TO 3 STEP -4/1  
FOR E = B TO 1 STEP 1
```

The last example is, of course, absurd but has been included to point home that even for the loop, we must exercise a little care.

6. NEXT A can be abbreviated to NEXT because there is no need to specify the variable although some think it is safer.

## Loop objectives

To consider some of the previous material, here are some loop problems and possible solutions.

1. A loop which prints out a table of the square roots of the odd integers from 1 to 17

```
Program 3.4  
100 PRINT CHR$(147)  
200 CLEAR SCREEN  
110 FOR I = 1 TO 17 STEP 2  
120 PRINT SQR(I)  
130 NEXT I  
140 END
```

Line 100 clears the screen. It is a cleaner method than the ponderous PRINT "CLR"; HOME\$.

2. A loop which prints out all integers between 5 and 24 except 12

```
Program 3.5  
100 PRINT CHR$(147)  
110 FOR I = 5 TO 24  
120 IF I = 12 PRINT 1  
130 NEXT I  
140 END
```

```
100 PRINT CHR$(147)  
110 I = 5: B% = 5: DO  
120 PRINT I, B%  
130 FOR I = 1 TO 1000  
140 B% = B%  
150 NEXT I  
160 END
```

Two points here. The program takes a little while to just wait patiently, the presence of the simple formula for printing integers but the section is about loops.



## Nesting loops

It is possible to have a loop inside a loop and indeed, one can do that, and so on, such combinations are called loop nests. There is a time to be too large to worry about in practical programming at our level. Here is an example of a single nested loop.

```
Program 3.6  
100 PRINT CHR$(147)  
110 FOR A = 1 TO 10  
120 FOR B = 1 TO 10  
130 PRINT A*B  
140 NEXT B  
150 NEXT A  
160 END
```

The inner loop is between lines 120 to 140 inclusive. The inner loop first revolves with the value of A fixed at 1 while the value of B goes from 1 to 10. The value of A then remains fixed at 2 while the value of B again goes from 1 to 10. This process continues and the value of the outer loopvar A has reached 10 before the process within the inner loop is repeated. The inner loop is simple multiplication of A times B, we are in effect printing out a table of multiplication sub in the PRINT line provides demonstration between the outer loop and B.

Finally, we should repeat that no attempt has been made in any of our programs to provide a nice screen appearance or to use local memory. These will come later. Such matters tend, in the early stages, to obscure essential points. Loops are so important that nothing must stand in the way while they are explained. Soon, we hope, they will become second nature to you.





[illegible]

E

**Tangle with snakes,  
coloured balls and  
squares in this game  
from Greg Hopkins.  
It's all Egyptian to me!**

# PYRAMID

THE AIM OF THE GAME IS TO keep around a pyramid while dodging the balls which rain down from above. Beware, especially, the blue ball which will burst into a poison after it reaches the bottom of the pyramid. The space will change size and can only be filled if you have it onto one of the teleport discs situated at the side of the pyramid. Once you have landed on all of the squares on the first screen, you progress onto a new more challenging level.

You commence with three lives and gain an extra life for completing screen one and then one for alternate levels after that. To complete each screen all the squares must be visited in the 30 seconds, this is achieved by landing on the squares a certain number of times, depending on the level you are on.

Level	Method
1	land once on each square
2	land on squares twice
3	land once but square changes back if landed on again
4	land twice — changes back to halfway stage if landed on again
5	land once but third landing completes screen square

Having completed level 5, you begin again at level one — but there are more balls to dodge

the time round.

The game includes three-dimensional graphics and a

short machine code program to move the snake more quickly. INSTRUCTIONS ARE

included in the program and control is either with a joystick or from the keyboard.



11



David Crisp helps you  
get unstuck in the  
joystick war

# GRIPPING STUFF

ONCE, THE LAST FEW DAYS I have been using some of the old favourites along with some of the newer joysticks. I played with several here. I don't believe a personal thing and what one person thinks is great another may think awful. Some of the comments regarding reliability are based on my experience working at one time at a retail outlet and so I have a good idea about whether a joystick has been a one off, or tends to be consistent in that particular type.

These are the three that I ordered they came to hand and not in order of preference.

**First joystick.** I have reviewed it here taken to court is used to do only they failed on courted. The down reliability was only tried after I had used them on court and so I can state all everything state out at 100% and lodged stuff into the walls. I used each joystick with an arcade game at the JETTY Willy car, a Drawing program and the famous INTERNATIONAL SOCCER cartridge which is, I believe, available from Commodore. The toughest test for each came when they were used with an Olympic type game where they needed to be triggered from side to side in order to move the character. I find that this was the ultimate test and that this type of game is similar to joystick anyway. If a joystick failed at this part of the test I'm I make a clue. From seems to have no bearing on strength it would appear, and the only guide I could find was the price they are the cost they are to break.

## Quickshot 1 & 2

We sold a lot of Quickshot 1 in the shop and it seems I counted them all out and I counted them all back in again. Unlike buttons, these were nearly all faulty. It seems you either love them or hate them. Personally I hate them. Some retailers say they are reliable others say they are not. I say they are not but would like to be proved wrong. When they started coming back in the shop, I put all one to pieces and the rest spent one at the



bottom of the shaft. There is a thick ring of plastic which actually pushes onto the charged contacts. I have seen this ring of plastic, as in the returned, splintered, had broken and, strangely, all had broken on the left hand side.

The rest of the joystick was fine, the button worked at the bottom made one handed operation easy and the contoured handle felt smashing. They were easy to hold for two handed use and were very packaged. It was just a shame they did not last. I did get hold of a new one for review and it broke (playing a wrong 100 yard drive). Same fault, same place. Life of the Quickshot about 30 minutes.

Then came the Quickshot 1. This one lasted a few days, about another two weeks. Can it truly be the same. In 100 Minutes, One

weekend and a car finger later it was played to the end was not. The charged piece of the joystick had been replaced by a cheap, great ring of thick plastic. The charged contacts I have ever seen had been replaced by the second cheapest switches I have ever seen. They had a low axial tolerance terminal metal tongue. The switch was a piece of very thin gauge metal with four prongs. The prong which was held to the left had broken off and the 'LF' prong was nearly off. The other prongs had signs of heating fractures. The rest of the joystick, like the Quickshot 1, was smashing. The speed (which has button was great, the response handler was instant, and I could not run left.

I took time and to being and the Quickshot 1. It also played in review with an open mind

## Kempston

The Kempston has been around a long time now and still seems to be a favourite. They are strong and very well made and have a number of finish sets on most joysticks. I find them uncomfortable to use and would not like one myself but many would agree to differ and so I would not criticize it. A lot of people dislike the stop and, to my knowledge, no one has been replaced. I can't seem to get comfortable with the fire buttons. The price is good and, as I have said, the quality of the finish is the best of all those I have reviewed. I can see the Kempston concerning to sell well, so far so good but a player, or a really thick except for the moment and fire buttons.

## The Cambridge joystick

Quite different to the standard looked this one at first it was only an old with an interface had now just the joystick can be purchased to use with any console that has the same pin plug. As can be seen, it is a different style and at first glance would not seem to be suitable for the fast play 'no up type games. I used one with a 'Spectrum at first and although they are not perfect they do perform well. They are well reviewed and some have got the best of the small design of movement they use a track to use. The manual is strong and they lasted through all the above games. When I worked in the shop we sold quite a few of these and only had one returned. This was due to poor reviewing on the mode of the stick, which was easily repeated. When I had finished I looked at all the others but it seemed to be a one off fault. They are made from a hard plastic, are very strong and withstand almost anything. They come in an extremely long shaft making the stick but this is due to the fact that the same package is used for joysticks which are sold with the interface of the

This physics comes into its own when used with drawing-type software. Because you need the stick as you would a pen or pencil it's possible to be very precise when drawing in high-end mode. Unfortunately a big stick of the standard type. There is another joystick available which looks exactly the same as this one, but it is not self-centering. That does not sound too bad until you start to use it, and believe me it's a pig. If this is the stick you would like then please you get the self-centering model. As with the flag, the part that you hold does not look comfortable for long once you get used to the feel of it in use. It is without doubt a two-handed job and attempts to stick it down for one-handed operation have not been successful. If you stick down OK, but, going anywhere, that is a considerable strain, as is difficult because your hand keeps touching the top button. The price is good and it is a well made stick which looks practical and performs well and has my experience is very reliable. As we are on the subject of reliability I will now deal with the two buttons of the track.

## The BOSS

The Boss is here! In the box was, this one looks very happy and sticks quite well to the surface, mostly due to its own weight. Its external design, except for the single top button, is similar to the fairly old QuickStick from the manufacturer which I owned. It looked the same and I used to use. The enclosed top button on its own and I found that most disappointing. It is strong and its internal seem to confirm that I had a machine to depend on. I got it straight from when I ordered it up. I expected to have a long of metal, but it was not there. What I did find however were the proper back-up and parts had I have ever seen. I am confident that this one will continue to work for a long time. The casing is as strong as any of the others and is super good in its grey and black coat. The five buttons are not the most pleasing I have used and it is not even very good at all. There was no click to it. I think it would be a good alternative to the QuickStick if you really want that type of stick, and it appears that it would give you a lot more action. Due to the reasoning that I did find that it was possible to find yourself going the wrong way by a short going and no it I found it had

high degree for some reason I had left feeling connected to the one.

## Super Stick

The Super Stick looks like a pig. Its splash box says it is built to measure longer than most, joints in and boasts a one year LIMITED Warranty. When I had taken it from its box I had to stop laughing long enough to try it. It looks bad, just as good and unique it was good enough. The SUPERSTICK is pretty — you like the splash box? It would look better if the colours were reversed. I wouldn't take from there for it being strong enough at all but it seemed. I pulled it apart and was amazed. There was almost nothing in it that would break. Its internal steel, it's a lesson in all popular engineering. The switches are built of metal tank into plastic stems. The control is a massive metal plate with arms built out. I put it back

together and plugged it back in and here is how it looks. I pulled it in to press again to see if it had suffered from a mark. It still looks real and a still looks plastic, but it is definitely not inferior. It weighs it more important to you than looks. This has a look at the SUPERSTICK. It has only got one fire button. It is about the size of a pig. It has got a most of it over, the one-contained handle slips and it looks hard but I challenge you to break it. I hope so. Great for kids and adults.

## The ZipStick

The ZIPSTICK is another that does the best of the City. It is advertised as strong and it is. The overall shape of the stick is a solid metal bar. A large colored diagram comes with the stick showing it's internal but I still felt the need to go inside myself. Everything is right inside and well fitting. I

could see the solid shaft and I was surprised to see fairly standard test-wires. The way they were placed through and the mechanism of the stick itself made them potentially a lot more hard wearing.

Again this one is a bit of a stick but it was very important and quite interesting. It is more comfortable use than it would appear and it was very sturdy. The chords are heavy but they do sound METAL. A couple of people who have seen it have also liked it and commented on how strong it was. This is another one that I tried to break. I succeeded in snapping my knuckles against the computer console and that was the only damage it took. It is a pigging but it is so well made that the cost seems justified. The fire button is on the base of the stick and is a little difficult to use if you are using it hand-held. My fingers were a little numb after a while but it is a little more than a pig. The color and gray coloring look nice and blend in well with my brown knuckles.

## Chetstick

Well then, that's the lot. You may have made up your mind as to which you would like. There I was going down to buy a stick today and you'd choose any of these I think I would go for the ZIPSTICK. It's a little on the price side but worth the extra. If my funds were limited then without any doubt I would choose the graystone red and black version that goes by the name of SUPERSTICK. I ask myself why but I don't know. It's just my story.

Before ending my article I should mention that when I put all sticks that just been announced. At the time of writing it was not available for the date of release should be only days away. It has been released for the Spectrum and from what I understand it has had the review. You may have gathered that I am not about the new colored joystick from Chetstick. No more on this one just parents a red light. It is supposed to have a wide angle of light spread so that when you use the joystick down to the left to avoid this last column it would still respond. I am sure that this one will soon be reviewed in the magazine so if you are thinking of spending about £20.00 on a stick I believe that will be about the price that you may be worth hanging on to. I wonder if it will interfere with the video recorder remote control. I



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Once again, our diligent reviewers have burnt the midnight oil to bring you this month's 64 and VIC 20 software selection.

#### 64 Doctor

\*\*\*  
Computer Software Assoc.  
CBA 44/544

The DOCTOR 64 package is a diagnostic program for Your Commodore. It begins a working time to a test for serious BBCs called a F.I.T. (It is located in PAL ROMS). If the F.I.T. is all right, then the machine is OK. If it is not, it will not allow you to do a full test. In order to run the test, you must enter a code in memory. I think that the people who wrote it had most of us in mind. As most computers have no full service department, this would enable them to check machines prior to sale. Also, if I found a faulty machine, it is due to operator error as opposed to a machine fault. The program is nicely packaged and, as usual with Commodore, coded first time. You can then select which part of the machine you want to check: an, a system routine, port through in-out, memory, and each with a lot of checks completed with a pass or fail mark. Patterns are used to eliminate the drive, you can have checked and when a particular item is observed a code tells off to the side of the screen and then the screen code to give you instructions to continue that particular part of the test. The test and pictures are not really necessary on a program of this type and seems to have the purpose of putting up the theme. In fact when you are going through a series of tests, the test while the picture moves is an obstacle. I think the theme that can be checked with a level concept of what each test does.

#### KEYBOARD TEST

As much as the BBC 64 test the screen, and as you press each key, the relevant key on the screen disappears. At



Commodore keys are not-so-easy for getting up the small screen and you allow you to check most of the keys at once.

#### SYSTEM TEST

When this is selected you are asked to select port 1 or 2. A graphic representation of port 1 is provided. Movement appears as well as a test to measure the line function. As you move the stick or press the line button a dot appears to show that a good signal has been received. I found the usual when doing system moves as it could confirm that certain had failed as opposed to the port test.

#### RAM TEST

The test checks all available RAM in order to identify faults. It is a test of RAM. It shows a row of dots. As the test progresses the row of dots gets longer. This is another useful test as one lucky RAM 128 can use the computer to work RAM memory that particular chip is called. Of course if the RAM is not the program would not load in the first place.

#### PRINTER TEST

Understandably the machine will only check printers connected through the serial

port. With such a wide variety of printers available it would be very hard to test impossible to write a routine to check printer, which when it is connected through the user port. This is another test which I have used many times when asked to look at some malfunctioning systems.

#### DISC TEST

This is a test for routine to the one located on the Commodore test drive disc, when you buy a 1281 disc drive.

It does a read/write test to each part of the disc and checks for bad sectors. Another useful test. I did not find a way of checking the second drive which has a hardware modification diagnosing it as device test as opposed to right.

#### VIDEO TEST

Most of a test card suite, it simply shows a one-off card and gives you a test that this is a good time to adjust colour brightness etc. I think that a video fault would be apparent without this.

#### SOUND TEST

The digital a manual drive and plays a series of notes to test. The sounds are pretty good and not very noisy anyway. After I thought

maybe I had a def 2D or speaker and but when I checked other ads they sounded just as bad and so it must be the program.

#### CASSETTE TEST

On the 1281 this is not a routine and when it runs the program drops out with an error. This is not really a fault in the program but a disadvantage with the 1281 if you run it with an and many 64s it performs a read/write test but if you do have a read fault then how do you load the program?

Other reviews for 64 Doctor have questioned the value of a program that must be loaded and run in order to use it on a machine as a test card. As I have said before this is a useful workshop tool and useful at home. It is not something that you would use very often but maintaining it, that is, the program does not work and no wonder it has last time was unemployed it with the power on maybe you did then up the port if played quite to doing that more than once.

One of the things would be useful on a retail store as well as a club or school. It is the only one of its type I have seen for the 64 and what it does it does well.

B.C.

## Zim Sala Kim

\*\*\*\*\*  
Midzone House  
1985  
C64/65

THE NO REAL ADVENTURE isn't known enough to recognize that Zim Sala Kim is full of promise, serious promise to be exact. And an adventure with arcade style graphics and scrolling screens isn't the bazaar of accomplishment to high atmosphere. Again, there's no to the storyline. Years ago, there were simply needed by the future all the more has been seen and it is on the verge of sensation. You are the only

able bodied man left and you have been chosen to break into the Sultan's palace and retrieve the board of cash. The result is that if you know the palace unprepared, the Sultan's guards might catch you and bring you to the dungeons. But then, wandering in the desert has its dangers too. However, the fact that you can act as if move around each location means that some of the action is over your own too can be easily found. Cliffs are hidden and have to be discovered. You will need all the help you can get particularly if you are to avoid the wrath of roaring food in the dungeons. But given, don't let that put you off. **K/4**

## Panic Quest

A  
Bass Games  
1985 (computer/MSX) (plot)  
C64/65

THIS, SAYS THE C64/65 references, is an able word game and by golf it about. And just in case you were wondering, it has absolutely got to do with the dancing tapir in the TV programme of a similar name. It is not the

play when dragons, dragons and knives to it cost free and an insane young wizard must win time and time before being accepted into the royal court. To meet the accuracy requirements a knight must journey from one royal castle to another gaining fame in battle and enough gold on the way. Fortunately he has a certain amount of gold to start with, enough to buy some weapons to see him through the initial encounters on the journey. To add to the excitement (and, the screen is quite live extremely well), the most exciting of which is a map of the planet's position. (Which, in a lot of

**K/4**



## Football Manager

\*\*\*\*\*  
Addictive Games  
1985  
C64/65

SO YOU CAN PLAY AS A team in the famous old football ground of a football background and get the manager of a successful football team. It's not a job but here's your chance, but watch out because it's a game addiction by name and



reference by name. Now it may be a game you are a really familiar with because it's been around for some time on other I use it the Spectrum but that doesn't mean to say that it is a bit of second-hand but far from it. In fact it is one of those games that is worth a look in gold. The object of the game is simple to find out a CUB at the bottom of the fourth division and with skill and dexterity to take it to the top of the division through a series of stages and 64 Cup matches. There's a chance to decline in the transfer market to improve your team's squad and even better, cash from the bank to keep your club at last. Each player has a skill factor and money reserves which become depleted the more he



play. Players too become unplayable for selection because they are injured. Once you have picked your team, the computer plays out the matches before your very eyes. Match results can upset the odds and the more favorable scores according to the success of the team. But don't get too flush with a run of success. The manager must now a test arena and a final game could get you the sack. After over 100 games because these games is a game that is going to get you to the screen. **K/4**

## Fred

\*\*\*\*\*  
Quake  
1985  
C64/65

THE AMAZING PART OF THE MANAGER of more games there are around these days? So what's new amongst them? You might well say that because you get too dependent, it's worth noting that Fred is something to offer the game. Fred is a rock underground and does not

go out. The only problem is that he's got to find the home and various other worlds and dominate them in the end without blowing himself up before he can pass on to the next level. Basically there are traditional scenes wandering around the maze domains to put a spinner in the words. Sounds more like that you've heard of all before, doesn't it? Well, not quite, because the graphics are more personal and there is a sense of a rock climbing art. What is the more Fred's strength is capped as the

names catch him and drops of and can go to find the home and various other worlds and dominate them in the end without blowing himself up before he can pass on to the next level. Basically there are traditional scenes wandering around the maze domains to put a spinner in the words. Sounds more like that you've heard of all before, doesn't it? Well, not quite, because the graphics are more personal and there is a sense of a rock climbing art. What is the more Fred's strength is capped as the

**K/4**

# SOFTWARE REVIEW SPOTLIGHT

## Waxworks

★ ★  
Channel 5 Software  
\$19.95  
CBM 64

YOW, MAKE IT PA THE  
founder of a waxworks and, as  
the waxworks on the package  
in such murdery surroundings  
draws evil and mysterious  
beings. Well, the only  
nightmares I'll have will be  
trying to figure the editorial  
put out. It's not that it's  
difficult but the problem is

what needs to be used. Lack of  
communication is understandable  
at this point but one of the game  
relates the feelings of the  
waxworks — dark and  
foreboding!

The program itself isn't in  
the same category as the  
standard Jack series but it is a  
new one. The graphics aren't  
as good as the old ones. Good  
revelation is one of the best but  
the software company does have  
an interesting bill command. If  
you are wondering who I  
haven't said anything about the



plot, that is because they do not  
want to say it's up to you to  
figure the waxworks, and  
even by your standards, to be  
my opinion I've been spoiled is

is a standard adventure with  
standard graphics, but I'll  
try and solve it just to put my  
mind at ease.

S.L.P.P.

## Savage Pond

★ ★ ★ ★  
Marsdale  
\$7.95  
CBM 64 + joystick

YOWHOW I CUT THE IMPRESSION  
that this might be a little conservative  
estimated. Not only do you learn about  
the evolution of a life commonly known  
as the frog, but it also gives you about  
various water and on the water level  
you will find various creatures ready to kill  
you if you don't kill them.

The idea of the game is evolution  
based in many ways as possible  
before ending up in the creature's  
dinner. As a way in the bookies that  
comes with it, you can continue  
to play frog games, after a while they  
are used themselves. This is true!

The game starts in a pond, hatching a  
frog opens a new way you know, connect  
the pond, and the eggs which the  
frog drops into the water. If the  
egg isn't eaten they hatch and eat you.

To see various a lot of water because  
you have to consume five worms to go  
into the next stage of development.  
Other hazards include jelly fish, flying  
to the pond, and water which has been  
dumped in the pond. Even if you do die  
I think you will still want to start again  
and discover the frog and the frog about  
frog.

S.L.P.P.

## New York Blitz

★ ★  
Marsdale  
\$19.95  
VIC 20 Optional joystick

I EDDIED AT THIS GAME THINKING  
have Marsdale brought out a new  
original game in the cheap price of \$19.95.  
As a result, there's another copy of Blitz  
in the store only named City Bomber. If you  
have never played this sort of game like  
Blitz, aim is to 1. jump the city in order to  
and your arrival which is running out of  
fuel. Once loaded, which is done with  
your own fingers, the aircraft moves  
across the screen, gradually decreasing in  
height. To board, press any key you can't  
make a mistake as City Bomber will do or press  
the fire button on the joystick control  
leaving a new bomb will destroy a  
whole city-block. This makes it a very  
simple game and I know through the story  
it is apparent that. Come to destroy  
the city, the enemy, the city and of course,  
New York. Once destroyed your aircraft  
lands automatically. The graphics are one  
character and the characters look like  
your own characters. The sound makes a  
lot to be desired. The only good point in  
this game is the price. At \$19.95 it  
must be the cheapest best-selling game  
around but as the story goes, I hope  
and Mars!

P.W.W.



### Kalah

\*\*\*  
Talent Software  
\$19.95 (casualist)/\$19.95 (hard)  
IBM 486

IT'S DONE IT AGAIN! The machine has got it in for me. Every time I come up with a good move it comes up with a better one. Man! you, I leave only, have playing this game for an hour.

Kalah is a board game, a

frustrating one in that it is, apparently, a very old game which was played in dozens of simple such primitive terms to do. In the English this game is a game from Talent Software the game consists of a board with 14 holes and 2 You own 7 holes and 10 dots the computer. 8 of the 7 holes are in front of you and the same for the CPU, the seventh is to you right called the kalah.

The basic idea is to win

more than half the pebbles which are played in the holes by moving them around the board until someone if you're victorious at this point, you would now play the game. The rules take little getting used to but after a few games it becomes clear that this is a definite strategy game.

I have also enjoyed moving the two pieces around in making this. They are Andrew Collins who wrote the program and

Mike Masters who designed the graphics. They deserve a round of applause for the software package as it is a very good indeed. S.L.P.P.



### Revelation

\*\*\*  
Talent  
\$19.95  
IBM 486 + joystick

IT IS AN INTERESTING game, but a doesn't quite get to be so good totally, and also very original in fact seems it is a shoot 'em up game with quite a large difference: not get it do you kill all the enemies, but you have to

destroy enemy which, in fact, reveal a possible sign. Once you have revealed all the possibilities there is a level blue. I wish to say that you can now see the level of the monsters and except seven levels are.

Apparently in this game there are 11 monsters all on the 10 different levels. They serve the game purpose in that to all now before you get to the last screen and stop the monster all

Apocalypse from being revealed. That basically is what the game is about, and I must say that it was a lot of fun, it didn't take so long to play one screen.

The graphics are fine except for the flashing of my character, and all the others which there is more than a certain amount on the screen. This would make for the machine's limitation of eight objects on the screen at once or

the program's limitation of using soft spaces. Overall, it is possible that as I said before, a truly better place on the earth, even it is a piece in the progress so far, but a dragon got integrated? S.L.P.P.

### West

\*\*\*  
Talent Software  
\$19.95 (casualist)/\$19.95 (hard)  
IBM 486

IT IS A PARTIAL GRAPHICS adventure which operates in real time. In other words you could be drinking another to shoot someone or not and they would die so that they would rather not have you around. The game West puts you in the position of being a law enforcer on the trail of a gang of mean robbers. It's your job to kill them and get promoted to Marshal. There are no problems are riding out to and around a ghost town, where somewhere is a large amount of loot.

The software compensates, but there are between two and three hundred words that the computer will understand. Unfortunately I couldn't think that because I was being that or that on by a salesman. It does have graphics, but only in computer. The graphics are again very good. I can say because the two main games in Talent have outstanding graphics too. S.L.P.P.

### Interdictor Pilot

\*\*\*  
Supersoft  
\$19.95 (casualist)/\$19.95 (hard)  
IBM 486 + joystick

IT'S A VERY INTERESTING game, the kind of space defense sort from the Federal Space Defense Force. If I had I have and it's exceptionally difficult and dangerous. Supersoft have presented a different type of flight simulator. Whereas most flight simulators a small manual is provided, Supersoft have gone all the way in producing a 4/ page thing handbook with everything in it around how to make the coffee.

The game starts with you, resulting in a full-screen view in the HUD. You are then transported to your craft waiting at one of the hangars. You have the choice of either going out into space or just running the mission simulator to see how to handle the Interdictor Pilot. It's one of those games that will take a lot of playing to get used to and that the best from it is a simulator.

The only drawback with the game is that it is a bit slow and occasionally doesn't come perfectly slow indeed. S.L.P.P.

64  
SUPERSOFT



## Election Trail

★ ★ ★ ★ ★  
Action  
IBM PC + joystick

HEY FOLKS, IT'S ELECTION TIME again in the big, old left of A, and this is something a little different, a party to Radio Shack's door. Election Trail is here to help you indulge in all the fun of the fun in the comfort of your own home. It's a one or two player game. If the one player option is chosen, the computer plays the Democrat's party. The object of the game is simply to win the first actual election and you

do this by winning the most votes in each of the four regions. At each turn you are asked to do one of four things: hold a rally, go on a campaign trail, hold a press conference or hold a public meeting. Each of which requires you make a roll of the dice. You then get the opportunity to move your men and either you, look at the open on polls or seek an endorsement. At the end of 20 turns, the whole election-picking operation gets to a halt and the states are divided up between the reds and the blues. A rough three is an even of states to the whole thing, the degree of dependence on the computer will quite high.

E.M.S.

## Flight Zero-One-Five

★ ★ ★ ★ ★  
Action  
IBM PC + joystick

AT LAST A BUDGET SMALL-scale for the unassigned audience. It's a little 1-2-3 "flight" yes, but it is less complicated than other games available for the expanded IBM PC but just right for a beginner. The user gets very good instructions on how to take off, climb, descend and land. Once landed, which is done without difficulty, you're to start the engines. Hold F5 to start up, then check the tanks and with a maximum of 90 seconds you're ready to take off. Press F1, you take off and you're supposed to bank up. Press and hold C, then up, you're now cruising through the air. You do suffer from random turbulence from time to time and have to control your course. Descending and landing need to be thought about. Check your speed and lower your undercarriage to get your nose down. Press C, if you're

lucky, you should land. I suggest you start next and play. Your flight time is about about 7 minutes although the next games 3 minutes. I couldn't find any bugs. The graphics are limited but the sound is quite good when you see the sound from the engines. Overall it is a very good flight simulation and the programmer has a computer alarm for every 1000 ft. Well done.

P.M.B.

# SOFTWARE H.I.R.C. SPOTLIGHT

## H.I.R.C.

★ ★ ★ ★ ★  
Action  
IBM PC + joystick

ACTION. HERE A GAME manufacturer for Atari game console. So what I hear you ask, the... the good thing about the company, making software for the IBM PC is that they are producing very good quality products. H.I.R.C. is a prime example of what they can do.

It is original, fast and has very good graphics. Some money has been spent down a creek shaft and it's not just to be a "demo" and have them "demo" and then a couple of levels. Whirlwind, the most that you will have to blow up walls and shoot creatures. To blow up a wall you'll need a missile, so use them wisely as you'll use them too. To make it more fun, you have a power which enables you to control and



## WHIRLWIND One Five

★ ★ ★ ★ ★  
Action  
IBM PC + joystick

destroyed with grace and care as the tanks go on all directions. Once you have used the power, leave two walls, making a little more of the same shaft and a few more obstacles to get over. Good things are the lava walls are lava flow. If you walk or land on these obstacles you lose a life.

E.M.S.

## Whirlwind One Five

★ ★ ★ ★ ★  
Action  
IBM PC + joystick

HELICOPTER GAMES ARE FOR and for between and the one from AA is the first 1-2-3 game for the IBM PC. The game loads very fast. To take off press F1

and do not aim the rotor blades of the helicopter as it will speed before take off. Using the key Q, A or D if you're a beginner it is to blow rockets which appear randomly across the screen. Once you have achieved it, the second screen appears. On this screen you see on a large open space which means there's a lot of light. Your assignment is to shoot down approaching objects. Your fuel is measured by 10 points for each rocket you have. Once the maximum target of 100 points has been reached you can then take off a your helicopter. Your base station has to be destroyed. Once destroyed, it's completely over the base and then drop your load, you then return to screen and "load" base, don't you believe it, most of the time you go to get a light. The graphics on this game are quite good as are the chance of victory. I also like the little touches which help to make it more interesting, a good title page and good sound.

P.M.B.

# Jetpack

\*\*\*\*\*  
 Bulletin Microsoft  
 MS-DOS (Commodore/CRISC) (disk)  
 £84.95 (disc/boxset)

AT FIRST GLANCE IT IS NOT easy to tell what this package does. The picture on the pack shows a game, the writing suggests a language and the company name suggests it may be a retail product. There is almost nothing on the packing to indicate that it is a BASIC compiler. A compiler is a program which converts a program into another form to execute speed and efficiency. In all machines that run in anything other than machine code, an interpreter has to be present to convert the program that has been entered into a form that the processor can understand. This conversion and checking takes time and can slow a program down to

in the documentation that it is very very slow.

The program for disc-based Commodore files comes with a dongle to fit into the joystick port on cartridge port, an auto-reload 5.25" 5.25" double floppy or a special form of single capacity diskette in a lump of plastic about 7" x 1.25" with a plug on the top. It only allows the program to operate when the dongle is present. Backup copies of the computer are made made but without the dongle they will not run. I use an SX-44 and while I was entering my 52,000 word list my dongle from the joystick port. My computer will not run now, but as it is just a normal program, another must be obtained. If you have a tape-based Commodore it there is a tape version. Unlike the documentation there are limitations to the size of the program you can compile (18) as the compiler cannot fit onto tape. It is a temporary loss, parts of the compiled programs. The price of the tape version though is to low that it could well be an excellent buy.

When you load a compiled

or automatically changed to BASIC translation of programs from one machine to another. Because of time and lab I have not been able to investigate this function as I hesitate to convert. Claims are made that some programs will run up to 25 times faster than re-compiled BASIC, but more programs will at times only 5 to 10 times speed increase. This however is still a lot faster and the majority of cases I did notice a very definite increase. I use a lot of subroutines to format figures and the delay between input, format and printing to the screen was considerably less.

For the most impressive feature was the impact. Garbage Collect. I have no power of software that can

Commodore collect memory for down a memory to you. Then Jetpack is an excellent way just to stop hanging.

To I wish there I found DT, BASIC to be extremely. Unlike some computers it is 100% compatible with BASIC and it is a pleasure on the 1540. The documentation is more than adequate and well written and I think any most often used utility program. I now compile a my BASIC programs if only to make them a little more efficient. One important point is that although the dongle is needed to compile a program it is not required to RUN a compiled program so you can still give copies of compiled software away. Unlike most compiler products, Commodore have adopted a very mature attitude



CRISC

much that it costs. Compilers turn a program into a form that is faster, I owe to the object code and in some cases have additional features to gain for less or more resources in the original machine. In the case of the Commodore, a form the standard garbage collect means, though more on this later.

Jetpack does all these things and is 100% compatible with BASIC 2.0, this means that you can compile any of your BASIC programs without modification, with some machines it is not possible to compile without removing certain parts. Another great feature of Jetpack is that if you use machine code routines loaded from within a program that is DT, in some cases it is necessary to POKE a couple of memory to do this but the procedure is so well described

program it is necessary also to have a set of routines or memory which are called the runtime library. These are loaded automatically when you use a BASIC. They do not use much BASIC at all and there are as a part of BASIC not often used. Machine code routines that I use such as Graphics, Machine, Software, do not exist at with the K11. Changing all compiled and uncompiled programs is possible and easy and it is possible to retain variable values and transfer them from program to program.

If you use non-BASIC commands called macros which are defined within the program it will compile. Drawings are given that a non-standard command has been found but provided it is a genuine instruction then the compilation process and the end result will still run. Some extensions to BASIC in the compiler allow for faster speed requirements which does involve some work and a custom also allows PEEK/POKE addresses to



almost the whole of BASIC. BASIC is now being using when the Commodore performs its infamous collect routine. I have watched the machine hang up for 15 to 20 minutes while it sorts out the rubbish. When compiled it did not hang up but for less than a second. It is now a great way to save things up and have back into life so speak, it the

to using the compiler with software that you want to market. If you will expect of your compiled programs simply speed. Drawings and PEEK/POKE. A chance to do not think like that. Just out of interest, below is the memory map to show areas used by the compiler (addresses in hex)

\$0000-\$0000  
 \$0000-\$0011

\$A000-\$BFFF  
 \$C000-\$CFFF  
 \$D000-\$FFFF

As per interpreter  
 Compiled programs and  
 variable list array  
 Run time lib.  
 Unused  
 Garbage collect. B.C.

# SOFTWARE SPOTLIGHT



## Astro Chase

\*\*\*  
Slate Soft  
\$19.95  
C64+ - joystick (2) (Cassette Board)

WRITTEN BY THE SAME GENTLEMEN who conceived Flip & Flop, Fernando Herrera has done it again. This game is almost trying to save Randy. I say that because it is very trying, and you almost lose in the end. Apart from that a lovely good. The graphics with the cartoon characters and the HUD overview are first rate.

However, it lacks a little of the 'tough' that Flip & Flop had. The game consists of shooting marauders from behind earth and killing as many Klingonians (they are possible while keeping yourself alive) as possible enough that two 'chase' sequences. I didn't have any serious fun, end of game for me.

How do you get over it which depicts your power, using with items. At the edge of the galaxy there are power points from which you can replenish your weakening strength but be careful because a marauder might wander the earth over a vast distance to hit you and performing this minor task (light different level) than if it were to be encountered on the 1st map, of which you can select up to level 15.

The customers are worth watching because as you progress your man is weakened (even in different ways). It's a good game but I did find it easy to switch off and buy something else.

S.L.B.F.

## Psycho Shopper

\*\*\*  
Mastertronic  
\$19.95  
VIC 20 & RAM Optional  
 joystick

WELL, ONE WOULD A SMALL Astro NATION was to get to the supermarket! Can you make it is tried to... you (or backed by an old Grandpa) there are the last of problems you encounter in this new Mastertronic game. You are a decorated shopper heading for the supermarket, collecting gold coins on the way. Grandma plays a big part in making your life difficult. On the

humping into a mad granny or any other obstacle you are confronted with. On the screen screen you arrive at the main road which you must cross knowing the cars, cars, and not many grapes. I can guess what you are thinking, get another version of Psycho Shopper, but this is more accurate. The third screen presents various lines and items. On arrival at screen four, grab your shopping basket and off you go around a maze avoiding of course yet more grannies. Once you achieve this you're back to screen one. The graphics in this game are reasonable and the sound gives a credible. It loaded very easily first time and it has a good tape page. At £19.95 it is very good value for money and a game not to be missed by any VIC owner.

## Forest of Doom

\*\*\*  
Puffin Books  
£10.00

LIKE THE HOBBIT FOR THE 64 THE Forest of Doom by Puffin is a sequel with a book. It is worth remembering that this game is based on a book written by Christopher Tolkien who is at the forefront of Dungeons & Dragons. This is an adventure game based around the basic rules of D & D. Once loaded you are confronted by a high resolution screen showing a detailed landscape. You have

I immediately thought that it was going to be a high quality graphic adventure. I was wrong at least up to the point I reached.

Let me explain the principles behind the game and what your task are. The

theory is that after riding some time kindly provided by the computer, you find all your characters' abilities. The higher the score you the better. Anyway once your character has its qualities set, then get a long feeling of what has happened in the world which you are now a resident.

The first good something like this — you are a resident of great reputation. One sense this you just happen to be near a spot where the great days have been won by dragons and the Hall of the Great. As it is one of the four rooms which have been stolen and one of it in the Forest of Doom. The other three are the Forest of Doom, the Forest of Doom, the Forest of Doom. You have something to do for you from the top of the great dragons and even if you are dead and alive or back to be an on the one as one as well you'll have some great fun.

S.L.B.F.

## Archipelago

\*\*\*  
Talent Software  
£7.95 (cassette) £9.95 (disk)  
SMB 64 - joystick

I DON'T NORMALLY LIKE WAITING 16 months for a programme load, but since I had already played Talent by Talent for the 64 and was greatly impressed, I went and wrote myself a coffee and got ready to play Archipelago.

After reading the instructions and a detailed Archipelago as a type of rare game. I started to have doubts. There have, in the past, been too many rare games and an addition to the very long list would make it too one more name to a never ending list. This was a hard to be very good to make it stand out above the rest.

The way is to collect the mysterious gems from a maze so that you can escape the maze and eventually go on to

progressively harder levels. As usual there are guardians who for some unknown reason want your blood.

Once loaded, the title screen and then the high score table are displayed. From a rather nice animation of a person standing with a hand running into a cave is moving finally leading up to the game.

As a conclusion I am tempted to say 'more presentation, same about the game', but I won't.

S.L.B.F.

## Patty the Potty Pigeon

\*\*\*  
Comcast Graphics  
\$7.95  
CBM 64 + joystick

RIDING FROM THE BENCH on the cassette version, I thought this was going to be a pretty soft game. Right how wrong you, reader! Barely a week later after maybe a half hour building

was going to be a huge behind! Patty, of course, is the ordinary, run-of-the-mill potty pigeon. He is also might suicidal! The idea is to use gravity to control the Perv, which will be dropped down onto the road to park up at the new building to go for money to park on to the new level. There are obstacles every-where taken back to the new. Naturally, it is not as easy as all that. Patty is pretty naive on

flight and almost totally unsentimental. But that's not all. There are obstacles to avoid such as the passing cars, the mail carrier on his way, Perv's wife, a streetcleaner job, and a variety of other names like the pigeon eating rat, the starving letter, the lame plane, the dooms and last watching sparrows. But Perv is not totally the hero. He has more than a few or two tricks

under his wing in the shape of some smoking, exploding eggs. Perv is game for whatever the passing cars, taking the rat, destroying the three ducks, good enough to go on any mail and problem. Up the barrels, too, and again, why call any building isn't fun! Certainly not lovable if the Perv, the star of this city love game.

E.M.



## Hip &amp; Flop

Star Trek  
\$7.95  
(CBM 64 + joystick) (Comcast)



WHAT HISS FERNANDO  
Fernando is a monkey called

Wack and a Rancore called Hip got in commercial. Well, Fernando wrote a game which includes these two characters in a very small enough block. It Hip have found that they can escape from the Zoo by completing a maze. The problem is it's on a 100 and after playing for a long time, there's a lot of your own

start to repeat. Anyway, by traversing the squares of the maze and finding special boxes placed at random on the board, you gain points and your freedom.

The first couple of levels are a dead end. Only you get used to the pattern, the last couple being achieved by finding a like a diamond (the bottom pointing at the 1's)

can then the fun starts. The even are made harder in the entry of the second part on level 1 and a stage by report on level 2. As the game progresses the maze gets larger in size complete with level 10. Certain achievements have been rewarded after every 10 levels of play as a reward for being very able.

The game is superb with very good graphics and sound. Oh yes, when you play in Month the Monkey the board turns over and you see from square to square but that's not the end of it! You can't see the money. Well, it can be dangerous or very useful is well.

S.L.P.

## Traffic

\*\*\*  
Chalk Culture  
\$7.95  
CBM 64 + joystick

THE STREETS OF DAVON ARE ABOUT to descend into complete chaos. Only you have the power to prevent it. You are a complete control of the traffic lights at each of the capital city, or road junctions and it is your task to manage them so that you stop the massive queues of vehicles from building up. With traffic flowing from all sides of the screen and no way of seeing whether it will run right, left or single, you are put ahead in a position, congestion seems almost inevitable and actually keeping the traffic flowing is more than a little difficult. If you ignore, your superior there is a chance of stepping on the promotional ladder and starting on more dangerous areas. The, of course, means different areas and more difficult cars on the road. If you fail, well there is always the chance to start a new game provided you are a rather poor government because these seem to be very little method to all this madness.

E.M.

## Daisy Thompson's Derathlon

\*\*\*  
Ocean  
\$7.95  
CBM 64 + joystick

WELL, WE DON'T HAVE A MITA person for this game as it is a sort of a lot of money in some cases. This is a good example of the game which is a game where there is a lot of money in some cases. This is a good example of the game which is a game where there is a lot of money in some cases.

The graphics of this game are very good with excellent use of space for both Daisy and the Computer (the challenger) throughout the two seasons. The game is designed, the world record is displayed and the cross of the game is shown. My comments about the game is referred to the way you move Daisy. This is accomplished by a side to side motion of the joystick. The last you move it, the last the last. The last button is also used to make him jump and then.

I did enjoy this game immensely but when I jumped on some something, my own always found on the last 17's worth.



jumping, but I do not the most at the beginning.

S.L.P.

**This utility from Mike Hart should help you format numbers correctly and iron-out bugs associated with INT functions on your 64.**

# PRINT USING ON THE 64

MIKE HART HAS NOW published in the past to provide a way of formatting numerical data so that thoughts is attached to the specified number of decimals and to ensure that the decimal point line up when the data is printed as a column. Many of these routines are very long and intricate, and may show the system down considerably if there are a lot of numbers to process. I therefore decided to write a system on BASIC which would be as clear and as economical as possible, which would approximate to the speed of machine code routines and which would format fully even "if float" numbers, such as those expressed in exponential mode.

In particular, the routine needed to:

- round both positive and negative numbers correctly, avoiding the errors that are commonly introduced when the CBM arithmetic routine processes certain numbers (e.g. try to round 0.123456 by using the INT(0.123456\*1000) approach);
- process numbers less than 2001 which would otherwise be expressed in exponential mode;
- put in leading zeros for values between 1 and -1 e.g. to ensure that 7 is expressed as 07
- add a fractional part of trailing zeros to -ve values consistently so that if three decimal places 2.3 will be expressed as 2.000 and that 2 will be expressed as 2.000 for example.

programmer can avoid "contaminating" the rest of the program (and I set up certain default values but these may be changed in the course of the program). It devised the demonstration is set up with three decimal places (10), a rounding factor of 1000 (24) and a "total length" of 9 (25). The string of padding blanks (10) can always be made longer if desired and obviously the GOTO at the end of line 1 points to the normal default for programs. Notice particularly that 24, the rounding factor, is specified exactly — if you specify a short-cut such as 240000, then the result may be internally stored in a slightly inaccurate form and that may introduce errors later on. This is due to the fact that the presentation involves manipulating the logarithm of a number and some loss of accuracy is potentially possible. A "balancing factor" is included to compensate for potential failures in round mode.

The internal construction of the program is as follows: line 1 makes a rounded string of the number multiplied by the rounding factor, hence that the value just as well for negative as for positive numbers. The "balancing factor" (line 2) is a secondary due to the fact that the CBM interpreter does not handle a round before performing INT

and one has to correct the deficiency. The balancing factor is the smaller that real-and-true has demonstrated to be effective for both positive and negative numbers. If you wish to demonstrate the presence of the INT bug for yourself then try the following:

```
PRINT 123.456789+10000*3;  
INT(123.456789+10000*3)
```

Both should give 123456 but the INT gives 123455 due to the bug. The presence of the "balancing factor" enables numbers such as 123.456789 and -123.456789 to round correctly to 123.456 and -123.456 respectively. If you do not mind the occasional mistake caused by the failure to round up then you can cut out the reference to line 26 and the whole of the lines 26-40 (44-25) on line 3. This also has the by-product of speeding up the whole sub-routine by some 50% but presumably I would suffer for a bit of a loss of speed for complete accuracy. Incidentally, the PRINT USING routine in the COMMANDE-8 chip is fast to round a negative number such as -123.456789 to three decimal places correctly.

Line 3 is only called into play for numbers (positive or negative) that are less than 1 and require a leading zero to be inserted. The effect of line 4 is to test, for example, if 123.456 is 123 or 70-60 into 0.007, numbers that

would normally be expressed in scientific notation get rounded into "normal" numbers by the code but a single digit that is not used for very large numbers which generally constitute less of a problem (line 5).

The line is one of the most critical in the whole sub-routine. It is an error that a 2 of 121.4555 has been converted to the string 25 of 123456 (on line 3) then this line moves the decimal point to the correct place, pads to the left with blank spaces, and prints out the result (leaving the cursor on the same line) before RETURNing. It is, obviously, necessary that integers avoid the line altogether and that is why they are taken care of by the conditional statement at the end of line 1.

## How fast?

Given that time has been taken to ensure that the routine is accurate as possible, how does it compare with machine-code routines for speed? In order to make meaningful comparisons, I wrote some small trials in which I compared the BASIC PRINT USING with up the COM-8 chip PRINT USING (a BASIC 4.032 PIT by the PRINT USING routine given by Radio Shack in "Programming the PLUS/1600" the results are summarized in the table below.

PROGRAM	MACHINE	AVERAGE TIME	ACH PER SECOND
BASIC PRINT USING	1-64	0.0040	10.5
BASIC PRINT USING	1-64	0.0011	26.5
BASIC PRINT USING	4032 PIT	0.0078	79.1
BASIC PRINT USING	4032 PIT	0.0025	26.7
COMMANDE-8 PRINT USING	4032 PIT	0.0022	27.2

The routine presented here is obviously contained in three files (i.e. lines 1-4) and assumes that whatever number one wishes to process has been copied into the variable Z. The other variables associated with the formatting sub-routine all start with Z, so that the

The BASIC PRINT USING stands up pretty well to the machine code equivalent in the case of the 68000 series, the routine works by iteration and does not round at all (and you have to do the scaling the number is used to the subprogram) nor will it attempt to protect numbers, expressed in exponential format (such as 1E-41) which always looks much better. As we have seen the COMMANDED PRINT USING also has some deficiencies and will also make a mess of some exponential numbers, e.g. 1E-60 which is 0.001 error, as 40,000 to three decimal places. All in all, the BASIC PRINT USING comes out well in the accuracy stakes and a so-

accuracy stake and also format and prints at some 70 numbers to the second which, as you can see, starts to get pretty close to the speed of the machine code real time at any rate.

### Use of PRINT USING

To incorporate the PRINT USING machine into your own programs it is best to type it in exactly as shown from lines 1-6, although lines 2 and 6 are designed to allow the user to, if he is at the very start of the program, the reason for this is that line 6 defines variables at the very start of the program and when these values are called the internal

variables do not have to travel through other variables in order to find them. For the same reason, comments have been defined in brackets at line 100, speeds up the entire subprogram. These techniques are applicable to other BASIC programs as well where speed is a measure. If you know that you are not going to require brackets then you can cut out the whole of the conditional statement contained at the end of line 3 and this too will speed processing slightly.

To call the subprogram merely copy whatever variable you wish formatting into *I* and then call the subprogram with GOSUB 1. You may consider that this is a slightly messy way to do it—why not use a user-

defined function instead? As you might have guessed the subprogram takes quite a bit more time to return and therefore it has the 'copy' method.

If you wish to alter the number of decimal places in the course of the program then you need to alter the parameters of 23 and 24. To effect the change, make 23 the number of decimal places required and 24 the relevant rounding factor. For example, to round to two decimal places make 23=2 and 24=100 before the subprogram call. These values remain in effect and you can change them again.

### Program Listing

```

10 REM ***** SUBROUTINE TO PRINT USING *****
20 REM ***** THIS SUBROUTINE PRINTS USING *****
30 REM ***** THE FOLLOWING FORMAT *****
40 REM ***** 1. THE NUMBER OF DECIMAL PLACES *****
50 REM ***** 2. THE ROUNDOFF FACTOR *****
60 REM ***** 3. THE ROUNDOFF FACTOR *****
70 REM ***** 4. THE ROUNDOFF FACTOR *****
80 REM ***** 5. THE ROUNDOFF FACTOR *****
90 REM ***** 6. THE ROUNDOFF FACTOR *****
100 REM ***** 7. THE ROUNDOFF FACTOR *****
110 REM ***** 8. THE ROUNDOFF FACTOR *****
120 REM ***** 9. THE ROUNDOFF FACTOR *****
130 REM ***** 10. THE ROUNDOFF FACTOR *****
140 REM ***** 11. THE ROUNDOFF FACTOR *****
150 REM ***** 12. THE ROUNDOFF FACTOR *****
160 REM ***** 13. THE ROUNDOFF FACTOR *****
170 REM ***** 14. THE ROUNDOFF FACTOR *****
180 REM ***** 15. THE ROUNDOFF FACTOR *****
190 REM ***** 16. THE ROUNDOFF FACTOR *****
200 REM ***** 17. THE ROUNDOFF FACTOR *****
210 REM ***** 18. THE ROUNDOFF FACTOR *****
220 REM ***** 19. THE ROUNDOFF FACTOR *****
230 REM ***** 20. THE ROUNDOFF FACTOR *****
240 REM ***** 21. THE ROUNDOFF FACTOR *****
250 REM ***** 22. THE ROUNDOFF FACTOR *****
260 REM ***** 23. THE ROUNDOFF FACTOR *****
270 REM ***** 24. THE ROUNDOFF FACTOR *****
280 REM ***** 25. THE ROUNDOFF FACTOR *****
290 REM ***** 26. THE ROUNDOFF FACTOR *****
300 REM ***** 27. THE ROUNDOFF FACTOR *****
310 REM ***** 28. THE ROUNDOFF FACTOR *****
320 REM ***** 29. THE ROUNDOFF FACTOR *****
330 REM ***** 30. THE ROUNDOFF FACTOR *****
340 REM ***** 31. THE ROUNDOFF FACTOR *****
350 REM ***** 32. THE ROUNDOFF FACTOR *****
360 REM ***** 33. THE ROUNDOFF FACTOR *****
370 REM ***** 34. THE ROUNDOFF FACTOR *****
380 REM ***** 35. THE ROUNDOFF FACTOR *****
390 REM ***** 36. THE ROUNDOFF FACTOR *****
400 REM ***** 37. THE ROUNDOFF FACTOR *****
410 REM ***** 38. THE ROUNDOFF FACTOR *****
420 REM ***** 39. THE ROUNDOFF FACTOR *****
430 REM ***** 40. THE ROUNDOFF FACTOR *****
440 REM ***** 41. THE ROUNDOFF FACTOR *****
450 REM ***** 42. THE ROUNDOFF FACTOR *****
460 REM ***** 43. THE ROUNDOFF FACTOR *****
470 REM ***** 44. THE ROUNDOFF FACTOR *****
480 REM ***** 45. THE ROUNDOFF FACTOR *****
490 REM ***** 46. THE ROUNDOFF FACTOR *****
500 REM ***** 47. THE ROUNDOFF FACTOR *****
510 REM ***** 48. THE ROUNDOFF FACTOR *****
520 REM ***** 49. THE ROUNDOFF FACTOR *****
530 REM ***** 50. THE ROUNDOFF FACTOR *****
540 REM ***** 51. THE ROUNDOFF FACTOR *****
550 REM ***** 52. THE ROUNDOFF FACTOR *****
560 REM ***** 53. THE ROUNDOFF FACTOR *****
570 REM ***** 54. THE ROUNDOFF FACTOR *****
580 REM ***** 55. THE ROUNDOFF FACTOR *****
590 REM ***** 56. THE ROUNDOFF FACTOR *****
600 REM ***** 57. THE ROUNDOFF FACTOR *****
610 REM ***** 58. THE ROUNDOFF FACTOR *****
620 REM ***** 59. THE ROUNDOFF FACTOR *****
630 REM ***** 60. THE ROUNDOFF FACTOR *****
640 REM ***** 61. THE ROUNDOFF FACTOR *****
650 REM ***** 62. THE ROUNDOFF FACTOR *****
660 REM ***** 63. THE ROUNDOFF FACTOR *****
670 REM ***** 64. THE ROUNDOFF FACTOR *****
680 REM ***** 65. THE ROUNDOFF FACTOR *****
690 REM ***** 66. THE ROUNDOFF FACTOR *****
700 REM ***** 67. THE ROUNDOFF FACTOR *****
710 REM ***** 68. THE ROUNDOFF FACTOR *****
720 REM ***** 69. THE ROUNDOFF FACTOR *****
730 REM ***** 70. THE ROUNDOFF FACTOR *****
740 REM ***** 71. THE ROUNDOFF FACTOR *****
750 REM ***** 72. THE ROUNDOFF FACTOR *****
760 REM ***** 73. THE ROUNDOFF FACTOR *****
770 REM ***** 74. THE ROUNDOFF FACTOR *****
780 REM ***** 75. THE ROUNDOFF FACTOR *****
790 REM ***** 76. THE ROUNDOFF FACTOR *****
800 REM ***** 77. THE ROUNDOFF FACTOR *****
810 REM ***** 78. THE ROUNDOFF FACTOR *****
820 REM ***** 79. THE ROUNDOFF FACTOR *****
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1010 REM ***** 98. THE ROUNDOFF FACTOR *****
1020 REM ***** 99. THE ROUNDOFF FACTOR *****
1030 REM ***** 100. THE ROUNDOFF FACTOR *****

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## Superbase 64

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2. FIGARO	100K	\$19.95	12. FIGARO	100K	\$19.95
3. FIGARO	100K	\$19.95	13. FIGARO	100K	\$19.95
4. FIGARO	100K	\$19.95	14. FIGARO	100K	\$19.95
5. FIGARO	100K	\$19.95	15. FIGARO	100K	\$19.95
6. FIGARO	100K	\$19.95	16. FIGARO	100K	\$19.95
7. FIGARO	100K	\$19.95	17. FIGARO	100K	\$19.95
8. FIGARO	100K	\$19.95	18. FIGARO	100K	\$19.95
9. FIGARO	100K	\$19.95	19. FIGARO	100K	\$19.95
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Peter Facebery tries to prevent fellow adventurers from getting lost in pursuit of their goals.

WITH THE RIGHT MIX OF magical/technological equipment, it is possible to see and hear from afar. The goal is obvious: the player can be just a mile away and the foe can be electrically foggy... but in an effort to keep you at least sane (if informed), the screen gives the lesser view out of the circle and gives a quick point.

Finally, ensuring mystical black runes to appear on the game of specially palped wood floor but no might involved. Technology takes it's toll and by the time you connect the to several pages, and transfer its apparent glider into some form of an electronic cable communication... some of our progress will already have been proved true (or false).

## F55 get the Midas touch

F55 are introducing the MIDAS adventure concept for the Commodore 64 — the Midas II Adventure Adventure System. This system is not just a collection of moving pictures, including 3D graphics, data compression, a form of artificial intelligence, mixed joystick and keyboard entry and experience modules for future games, the first adventure using the system will be "Islands and Treasures", which appears from F55 releases to be another fine example of "mean and meanest". Your character may be developed in traditional style and then progress through further "Islands and Treasures" modules... Islands great — we'll be very close to what we see and!

## Picturing adventures together

Midas Publishing have their adventure game for the Commodore 64 called "Islands and Treasures". It's been written by David J. and is a graphics and text adventure based on the author's book by Terry Jones. Screen shots on the packaging look good — so enjoy your eyes when you play.

Also from Midas, but this time programmed by Shari Software are "The Standard Gold Rat" and "The Rat of Time". Both are based on books by well known

# TALES FROM THE CRYPT



author, Harry Harrison and Michael Moorcock, respectively. The releases feature copies of these two wanted to be a little slow in response time. Two reviews may well be enjoyed — watch the release for the low down

## Beyond midnight

Beyond Software have first got to the point of releasing "Islands and Treasures" (well almost) for the Commodore 64. This program has caused quite a stir since it's introduction for the Spectrum and is eagerly awaited by all. "Islands and Treasures" is the boundary between an adventure game and a strategy game and is anyone's standard. Produced an epic story. On the Spectrum some 32,000 different views of the landscape are created... I can't wait!

## Talent goes West

Talent Computer Systems is a new software house and amongst its offerings is a mainly text adventure for the Commodore 64, all you other Commodore owners — but this is the way the system operates. Called "Islands and Treasures" it is set in and around a ghost town in the Wild West — you J. T. S. Software had better do those legends and check your pocket's waterproof!

As this will be a regular

adventure series, we hope to feature a certain character with you the reader. If you have any views or news — let us know. We might even be able to help. Alternatively it might be just as pleasant to learn that an argument would and never solve that problem either.

## You are on a mud bank...

What next? This is part of the opening sequence that you will find in entering "Dungeon Adventure" by Level 5. You turn of course "Islands and Treasures" which way, to try and find something — anything! — and generally get the feel of the game. Finally, some of us have to "get going", move and be damned etc. But, if you are planning to be a true adventurer, surely must return and out should come pencil and paper as you carefully start at the beginning.

Very simply, if you go have a quick "look around" before entering "Islands and Treasures" — don't forget to "look around" — you do not start from anywhere you may find that quick "look around" has used up some of a pre-defined number of moves and the lightning might go out... On you may develop blazes, before finding the landmarks etc.

As you move, study each landmark description carefully. There may be no settings but many of the clues to solving



the game will be in what you see and mean (usually in the better graphics games). Sometimes, the descriptions will tell you which way you may move — even if this is not, tell you all directions, anyway. Some programs have the photos (pictures) which are a little bit of your imagination as to what the actual scene may be.

Moving may sometimes prove to be a puzzle in itself. Most adventures will accept a verb and a noun — in this order "GO NORTH" — some will accept more complex sentences and many will be quite happy with single letter words for directions — N, S, E, W. Find out what your program accepts. Why make time typing GO NORTH if you can make it easy to do?

Simple movement directions are usually no problem even if you do have to type in GO WEST in full. What can prove baffling is how the programmer has interpreted requests for other seemingly simple actions. Try not to get too frustrated if what you think is obvious was not to be the door into programming. Ideally such adventures should recognise all the synonyms for any given word, but many limitations often preclude this — just for patient and learn the system!

There may be a license limited at, which appears impossible to reach by using the complete game, F55, Midas,





Once again, we have browsed through our Commodore bookshelves to bring you this month's library offerings.

# REFERENCE LIBRARY

**Book Title:**  
VIC-20 Mind Stretchers  
**Author:**  
L. Cressley  
**Publisher:**  
Sigma Technical Press  
**Price:**  
£5.95

DISGUISED WITH THE EACH one of VIC-20 games filling the shelves of software outlets are prepared to spend a little time and effort tapping away at the keyboard! They lack out the great of one game for the book of 16 Mindstretchers from Ian Cressley.

These games seem to have a high destructive element: there are bombs galore in Bomber where your aim is to bomb buildings and while avoiding the anti-aircraft missiles, Submarine where you race to bomb submarines from a pit and Destroyer where you must protect an underground city from the alien being to bomb it. If your idea of fun is confrontation with aliens and assorted weapons, then test your skills at Alien Assault where, while a missile to the top of the screen, you must shoot the aliens emerging from the bottom. Monsters where you have to defend the town's kids from the Monsters and Bombs where you must lure the monsters into the pit hole at the centre of the island. Bombs is also feature with alien where you must avoid being eaten by the alien while timing through the jungle. Cat and Mouse where you must get the mouse out of the maze without being eaten by the cat and Mouse where you score points by eating up green numbers (why this obsession with eating?). Mr. Cressley does produce the odd game with such well-known numbers as Mastermind, Breakout and Connect 4 but the book is also replete with such obscure



computers as Asterix, an Ancient game of logic and Hammasud where, having been appointed Hammasud, you must rule the ancient city of Hammasud for 10 years. An interesting addition is Ufo, a version of a simulation of the life of a Ufo. The book concludes with a few word games.

Finally, although the index entry in the programs can be described as thin and sparse. It is not to discover the "computer science" which Mr. Cressley promised would help in "creating your own program".

**Book Title:**  
Mastering the Commodore 64  
**Author:**  
A.J. Jones and G.J. Carpenter  
**Publisher:**  
Ellis Horwood Limited  
**Price:** £5.95

THIS BOOK AIMS TO provide those readers, already at home with the Commodore 64 and BASIC programming, a deeper understanding of the machine and its capabilities.

The first chapter studies BASIC — BASIC keywords, arithmetic functions, string functions, logical operators, input/output statements. The reader is then shown how to facilitate BASIC programming through macros, string handling and structured programming. Next, binary stretchers and sorting methods are incorporated into a chapter on data manipulation and BASIC is combined with the 6500 microprocessor in a chapter on memory management. Lists, graphics and sounds are examined in detail before discovering what the 64 has to offer in the way of peripherals. The authors get to the heart of the 64 with a study of its system architecture, the operating system and the kernel. By this stage, the reader should be ready to handle much no-code programming — the writing of 1000s of lines of 6502 assembly code, although using an assembler and a full instruction set. An insight into the 6526 Complete Interface Adapter, the 6510 and the registers of the 6502 chip is contained in the final chapter. Assorted appendices and listings complete the book.

So, if you wish to expand your BASIC knowledge and fully master the possibilities of the 64, this master guide would be just what the doctor ordered.

**Book Title:**  
Putting Your Commodore 64 to Work  
**Author:**  
Chris Callender  
**Publisher:**  
Interface Publications  
**Price:** £4.95

THIS SIMPLIFIED OF business applications enables the reader to put the Commodore 64 to work as a

#### FOR THE SYSTEM

The first program, *More...*, turns your 64 into a word processor, about as very limited one with 10 commands at your fingertips. Other applications included are a Database package where you can store and retrieve information on your Commodore and Cards file to make your conventional card filing tedious. Be spared unpleasant confrontations with your lists manager by keeping track of your spending with Home Accounts and for those of you with short memories, try as you go, or long-term engagements with Planner of Calendar, Making List and Telephone Directory. In you so demand that dog-eared address book and Spreadsheets, a spreadsheet package, and Track Control are provided for more serious business applications. The most useful programs in the book are chained together with BASIC Business Directed Software toward at the end of the book.

Although these programs cannot hope to replace the most comprehensive package on the market, they should appeal to the business man or woman with limited needs and a low budget.

#### Book Title:

*The Sensible 64*

#### Author:

David Highmore and

Lex Page

#### Publisher:

Micro Books

#### Price:

£5.95

THE BOOK CLAIMS to offer a less technical overview of the Commodore 64 and its various aspects than the other titles in the market. It is aimed at experienced programmers and more able. Presented in a very plain format and produced as a single sale, it proves that you don't have to spend on glossy papers and elaborate design to get your message across.

The authors haven't produced an absolute introduction to the world of the Commodore 64, rather than covering the fundamentals of programming or summarizing the capabilities of the 64, they search into the subject of alternative input — the CAT command — and the various screen keys. Illustrated graphics and, in a few places of text, gives are then investigated. The delight of



screen saving, extending on the book, high resolution bit mapping, X-Y co-ordinates and bit map graphics and systems are then discussed followed by an insight into sound and music on the Commodore 64. Information on disc drives and the pager capabilities of printers conclude the book.

To sum up, although not for those readers who don't know one end of a computer from another, this book, sensibly illustrated with diagrams and examples, provides a useful introduction to most aspects of the Commodore 64.

#### Book Title:

*Getting More from your Commodore 64*

#### Author:

Mark Harrison

#### Publisher:

Sigma Technical Press

#### Price:

£6.95

ANOTHER BOOK CLAIMING to make some sense out of the Commodore 64 manual. The

comprehensive volume takes you from start-ups and Charles Babbage through BASIC programming, high resolution graphics, sound and the relative complexities of machine code on the Commodore 64.

Starting with a brief history of computers, the book leads into a general overview of the Commodore 64. It then guides the reader through programming techniques, Commodore 64 BASIC, the 64 functions character set and string handling. Commodore logo, the 64's memory and character table, more are covered before heading the more intricate high resolution graphics and sprites. Bring your Commodore alive with a chapter on sound and turn your computer into a business system with know edge of file, data storage and printers. The book concludes with information on data structures and machine code programming and a lot of useful applications. I found particularly helpful the notes in the programs used as examples throughout the book.

There are repeated introductions to the Commodore 64 on the market but this one seems to delve deeper into the subject than any of its rivals and should prove invaluable to those readers who find the user's manual daunting. The 64 manual from cover to cover.

#### Book Title:

*Getting started on your Commodore 64/C 32*

#### Author:

Tim Hartnell and Mark

Ranshaw

#### Publisher:

Future Publications

#### Price:

£2.95

THE COMPLETENESS OF THIS program's guide to the VIC 20 and a first one of the authors is a schoolboy — the category of its readership is probably chosen. Unlike more so-called 'introduction', this paperback book really is a manual for the

somebody else may find the authors' approach rather unconventional.

The book starts where any self-respecting beginner's guide should start — with an overview of the VIC's keyboard. It then guides the reader through the basic levels of programming — screen input, editing and printing, Random numbers, loops and subroutines are explored before venturing into the world of sound and music on the VIC. 2D Sprays and data are covered before tackling PEEKs, POKEs, and traps. Finally, the reader is shown how to add graphics — user-defined, multi-colour and high resolution to his programs. The reader is encouraged to make constructive use of his new-found skills with the sample programs liberally scattered throughout the book.

To conclude, although this book won't teach you all you ever wanted to know about programming the VIC 20, it should give you the knowledge and confidence to conquer some of the more secreted guides available.

#### Book Title:

Commodore 64 —  
BASIC Programming and  
Applications

#### Author:

Larry Joel Goldstein and  
Fred Mosher

#### Publisher:

Prentice/Hall  
International

#### Price:

£7.95

THIS BOOK PROVES A comprehensive tutorial on programming in BASIC on the Commodore 64. The text is accompanied throughout by programming applications and exercises to test your progress.

The book commences with an introduction to computers and a look at the 64 itself. The authors then take you, step by step, through the BASIC programming language. Each lesson is incorporated into a program and, at this level, you are encouraged to 'Test Your Understanding' before adding loops and subroutines to your programs, learning to input data and manipulating strings, and coping with random numbers. The major Commodore peripherals — cassette recorder, disk drive and printer — are covered. A chapter on filing on the 64 is consolidated

with a two-part Word Processor. You are finally instructed to apply the knowledge that acquired to creating graphics, designing games and adding sound and music to your applications, and

try your hand in the games market with a chapter on creating computer games. The book concludes by showing you how to enhance your BASIC programming with 'A man's BASIC'.

The authors have produced a clear and informative introduction to BASIC programming on the 64 elucidated throughout by example and self-test exercises.



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# AUTOCALC 64

COMMODORE 64

## THE SPREADSHEET IN A CLASS OF ITS OWN

Q: Which spreadsheet is suitable for accountants, engineers, scientists, and home users?

A: Autocalc 64 is ideal for any application involving extensive manipulation of data and formulae from financial planning to market research.

Q: Which spreadsheet offers an advanced level of formula handling?

A: Autocalc 64 copes easily with trigonometrical functions, parenthesis and boolean logic as well as totalling and averaging

Q: Which spreadsheet accepts complex conditional statements?

A: Autocalc 64 can handle statements as complex as IF  $a1 < 4,000$  OR  $a1 > 8,500$  AND  $a2 \cdot 1 \cdot 500$  THEN  $b1 \cdot 10$ .

Q: Which spreadsheet offers a flexible screen format?

A: Autocalc 64 allows you to select (i) column widths from 3 to 30 characters (ii) the number of rows/columns you need (iii) up to 3,500 cells of information (iv) text or numerical entries lined up to the right or the left, or a combination.

Q: Which spreadsheet offers a choice of numeric formats?

A: Autocalc 64 gives you a choice of (i) integers (ii) floating decimal point (iii) currency (iv) any combination of these.

Q: Which spreadsheet offers a full 'replicate' facility?

A: Autocalc 64 has an advanced replication function for transferring text, data, formulae or conditional statements from any cell (or block of cells) to any other(s) without monotonous retyping. A 'go to' facility will take the cursor instantly to any cell of your choice — saving time.

Q: Which spreadsheet is easy to use yet advanced in operation?

A: Autocalc 64 is designed to guide you — helpful error reports diagnose input or formulae errors. A full demonstration program and comprehensive instructions are included.

Q: Which spreadsheet is compatible with standard Commodore printers?

A: Autocalc 64 gives you a printout facility using any of these printers: Commodore 1515, 1525, SAMP 601, 1526, MCS 881, DPS 1101, Silsiloha GP100VC

Q: Which spreadsheet is 100% machine code for fast, efficient responses, and offers a choice of saving to disk (using 1945 drive) or to tape using a C24 unit?

A: Autocalc 64 — as if you didn't know!

Q: Which spreadsheet sells at a realistic budget price?

A: Autocalc 64 costs just £14.95 on tape, £19.95 on disk inclusive of VAT and P&P.

Q: Where do I get one?

A: Ring us now on 06286 63531 (24 hours) to place your ACC/PAY or VISA card order, or complete the order form and send it to us today. (Prompt delivery promised). Autocalc 64 is available only direct from Richard Shepherd Software.

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**RICHARD SHEPHERD SOFTWARE**

**Chris Palmer takes  
another look at MIDI  
and shows you how to  
set up a system.**

# MIDI REVISITED

THOSE OF YOU WHO MIND last month's article must be wondering just what a MIDI is. Well, it's not an animal, vegetable or mineral. In plain English, a MIDI (Musical Instrument Digital Interface) allows you to connect to interface various musical instruments (usually keyboard-based) together, transferring information from one source to another and vice versa.

For many, the most important feature of MIDI is that it also enables you to plug these devices into a computer. This means that your computer can record what you do on any keyboard which is attached and, if you want, play it back on any other keyboard which is attached.

Because a computer is very good at manipulating information of any sort once it is stored in its memory, it is also possible to edit or change the musical information on. This is obviously a great boon to both professional and amateur alike, because we can make mistakes.

You don't even have to be able to play a musical instrument to use a MIDI computer system. The mere entering information into your computer can be entered using the computer keyboard and then played out through a MIDI device attached to the computer, a sort of speech-synthesizer if you like.

So, that being said, let's see, how let's have a look at how to go about setting up a system.

## Setting up a system

For the purpose of this piece we are going to take the Commodore 64 as being the best for our computer/MIDI system. Why the 64 you might ask? Well for the simple fact that the 64 is one of the most popular computers around at the moment, and therefore a lot of the development of MIDI interfaces and software is done for the 64. So, having agreed that the 64 is the heart of the system, let's consider what we need in the way of a mouth.

When buying an interface of this sort, you have to apply similar criteria when you buy a computer: clearly, what software is available. You don't want to land yourself with a system which isn't going to prove worth you.

A lot of the computer producing interfaces are themselves producing the software to accompany them. This at least means that the software will run alright with the interface, but it does create other problems. Because the software suppliers are so involved with the design and development of the interface they often lose sight of the fact that it is the ordinary user who is going to have to use the thing. Quite a few of the packages which I have seen have been less than friendly in places. More often than not the documentation and examples given in the manuals are misleading at best.

Given that we are a nation of tekkies, it might also be worth your while finding out how accessible both the software and the interface is to prying programmers. While I know you might even be able to tell your creation how to interface, try and find out what the computer's future software plans are, and whether any other software companies are working for the interface.

## Ins and outs

The purpose of an interface is to pass information from one place to another, so let's have a look at what your interface should have in order to tie to the outside world.

Let's start at should have a five-pin DIN socket labelled MIDI OUT. This is meant a because, without it, your great composition will have to wait to travel to the keyboard in order to be played. Don't worry if the interface has more than one of these, it just means that the interface can tie to several at once than one keyboard at the same time without having to resort to the vagaries of MIDI THRU.

If you want to be able to send MIDI information to the computer from a musical keyboard, then you will need a MIDI IN. This works in the same way as a MIDI OUT, only backwards. You should only need one of these, because unless you are a closet Jack Wademan, it is unlikely that you will be using more than one keyboard at a time to program the computer.

Though not essential, another option you should look for is SYNC IN/OUTPUT. With one of these you will be able to plug back any computer at one with an external source. More often than not this will be a clock

source or reference box, which provides a trigger signal out for use for this purpose. I don't really see you can't synchronize with a real drummer, or there we... no doubt have exceptions to having a plug plug connected up any one else on line.

The last connector you might run up against is one labelled MIDI THRU. What this does is provide an exact copy of the information being passed to the interface via the MIDI IN system. The real advantage of MIDI THRU becomes apparent more and for keyboards than on the interface. Using it you can "chain" several keyboards together in such a way as there will be no discernable time lag between you playing a note on the first keyboard and it sounding on the last.

Alone all when buying the interface, make sure that it will do what you want and, if possible, have it demonstrated.

## Sorting out the software

Carrying on our journey from the first, in the month, we arrive with brains (mentally) where any system stands or falls, on the quality of the software. It is very difficult to say one firm delivers better software than another has a different idea of what they want to do with a volume





At the moment, MIDI software is a lot less expensive: computer programs which record, replay and edit musical information, which a) send down the MIDI bus from a virtual keyboard, and then b) which perform similar functions, but who take their input from the computer keyboard.

The game conservativeness of programs is the amount of storage space that is available for the note information, that's worth having a program which can store 16 keyboards, not any part of the tune and make the rest, if it can only hold two octaves of music. For a computer program to be any good you need to be able to store more than one part into it, and then have them played back simultaneously. If you are after one of these 'touch-and-go' packages, then I feel that the limit of how many tracks you can use, saved how much more information can be stored on each track.

If the package does not use a MIDI keyboard as an input device, but does not seem to have to use to input the note information. It would be pointless buying a package that uses standard musical notation if you do not know how to read this.

If it is a multi-track package, you find out whether each track can be sent to a different keyboard as one of the few pointers of a system like this is the ability to route an on-board and play back of many. Answer all, when you choose the software, have a few idea of what you want to do ahead in your mind and then make sure that the author the package can do.

## Choosing a keyboard

Leaving the leads now, especially through the noise we journey into water space in search of the device which is going to turn our wonderful composition into reality.

By now, the synthesizer

keyboard market is fairly as hot as the Irish market. High top and music shop and you will immediately be assaulted by how soon some of every synthesizer, transmitters, and the rest in LDOs, LDOs, VCTs, others, formats and stages. If you ask a shop assistant for your bag you will soon realise that this computer industry is not the only place that converts an opinion and a handshake.

For a lot of people the criteria on which a keyboard is bought is partly price. The problem is making sure that you're getting the most of what you want for the price.

Obviously, the price-conscious that the keyboard must surely is that it must be MIDI compatible. On the interface, it must have both MIDI IN and MIDI OUT sockets. Find out whether the manufacturer can change the MIDI channel it responds to. This is particularly important if you intend to use more than one keyboard with the computer. For instance, if you have two keyboards with the same MIDI number attached to the computer, it will not be able to differentiate between them. This destroys the advantage of being able to play like a piece of music, with different parts being played on different keyboards.

If you are not yet conversant with how a synthesizer works, it would be best to buy one of the MIDI equipped guitar/synths which are on the market. If you cannot get into this, as well there is a plenty which offer pre-set, pre-programmed sounds which will get you going.

Find out what information the keyboard sends out via MIDI. This can range from only the note value and duration, right up to the parameters that make up the sound.

As a rough guide the keyboard should send the following information: the notes which are being played, the position of the pitch bend control (if it has one) and any

voice/program changes which occur. With this information coming through MIDI, you should be able to record on the computer every aspect of your performance on the keyboard.

It is hard to stress that the keyboard will work with your computer/hardware/software at some combination and not work, despite the fact that MIDI is supposed to be a standard.

## What's around

Hopefully now you will have idea of the idea of what you are after when putting together a computer based MIDI system. To help a little further, here are some interfaces, keyboards and other machines which would be a good place to start research all on the road to computer computers.

## Interfaces

### Sequential Circuits Model 10 Sequencer

This contains all the operating software in ROM and plugs into the sequencer part of the kit. It has MIDI IN and OUT, a plug with facilities for connecting it to an external source. It can be programmed on real-time and offers multi-track recording, editing and auto restoration. It has a capacity of up to 400 notes in real time. Proposed software updates include step time input. The price is between £150 and £180.

### Real MIDI Computer Interface

This interface comes supplied with a two way adapter which will fit both the SE and the Spectrum. It features three MIDI Outputs, one MIDI IN and a MIDI THRU. It also has a control port for external synchronising. The software is available on disc or tape and at the moment comprises a 16 track, monophonic sequencer.

where the new information is read from the computer keyboard. Also available is a custom track real time sequencer in which each channel can be assigned to a different MIDI device. The price of the user's manual is £5.

## Keyboards

### King Poly 800

This is an eight note polyphonic synthesiser with 64 internal memories. The sounds are a little thin, sometimes but are on the whole very good. The MIDI channel can be changed and is implemented through a MIDI IN and MIDI OUT socket on the back. The King 800 is available also in the form of the 1000 which is a keyboardless sequencer part. Its keyboard is virtually identical to the Poly 800 except that it lacks the keyboard and the level control. The price for the Poly 800 is between £400 and £450 and the 1000 between £300 and £350.

### Self 8000

The brand new keyboard from Self features 16 preset sounds of which any two can be split between different places on the keyboard. It also features an arpeggiator and which can be programmed. The quality of the sounds is quite good considering the price of around £400.

## Drum machines

### Yamaha DX10

A very good digital drum machine which can actually be played from a keyboard via MIDI. It has the internal memory to store 100 patterns and 16 steps made up of 25 parts. MIDI IN and OUT are provided, making it possible to record and play back patterns using a computer. Price is around £450.

**When you are stuck with only one disc drive, making your back-up copies can be a long process. Take out the strain by using this program from Graham Davies.**

IF YOU OWN A SINGLE disc drive, you will soon come across the problem of backing the disc up. Even if you own two drives or have access to a twin drive, there is a need for a good, effective back-up procedure. There are several programs available to do this but all of them require several disc changes. In fact, the minimum number of disc changes for backing up an entire 754K disc is three because the Commodore-64 can hold about 62K of data at a time and a 754K disc holds about 165K of data.

Another problem with these programs is that they are often difficult, confusing and clumsy to use. The enclosed program goes some way to solving these problems. You will notice that apart from actually naming a file and writing a file, the program is written entirely in BASIC thus making it easy for you to improve on it and add your own extra commands and functions. If you select one of your discs that you require to back-up, you will probably find that you only really need to take a copy of about half the files contained. This will arise due to several reasons: perhaps you already have a copy elsewhere; there may be several versions of a program you are writing; on the one and you only need to take a copy of the latest one and so on.

#### Drive on

The program will work for a single drive, two drives on different device numbers or

# MULTIPLE FILECOPY

# MULTIPLE FILECOPY

for a twin drive. The facility is given to header the disc you are copying onto so you may use a hard disk (unformatted) disc if you have a single drive then you will simply press Return over the first four questions. The directory will be read in and listed to the screen. Displayed will be the file name, the filetype and a 'y' against each name to indicate whether to copy the program or not. The program will not copy relative files. You may now cancel up and down the screen and enter 'y' or 'n'

against each entry. If you cursor all the top or the bottom of the screen (assuming that there are enough entries) then the display will scroll. If you press 'h' or HOME the cursor will move to the top of the screen. When you have finished, press the 'v' key.

Having pressed 'v', the files to be copied will be listed to the screen with the amount of space taken by each, then the total buffer size and the difference between this and the sum of the programs' size will be

printed. The chance is added the buffer given. If there is enough buffer space then the answer to this question is defaulted to 'n's. If there was not enough space then an error message is printed and the answer to this question is defaulted to 'y'.

The copy will proceed when you are ready and at the relevant time you will be prompted to insert your destination disc. Any disc errors are reported and if a file already exists on the destination disc, the option to overwrite it is given.

## Getting lined up

Lines 100 to 140 in the program listing bring down the top of memory (which you will have to reenter having run the program), set a pointer to where to put the machine code and also set the buffer start and end points. The buffer is the area that we files from the disc will be stored in. Note that the full capacity of the Commodore 64's memory is not being made use of here. Also note that by changing these pointers, the program

will run on any Commodore machine.

Line 150 allows up to 80 files to be read in from a disc which should be more than enough. If it is not enough the program will crash with a bad subscript error and you will have to increase all of the '80's on this line to cater for this.

Next in the program, the machine code is read in from the data statements at the end of the program and PC6000 into RAM. This machine code simply reads a complete file (its job is to

Lines 300 to 330 ask for the information about your drives and gives variable defaults. The directory pattern is the same as when you load a directory from a disc, that is '!' will return all of the file names starting with '!', 'dir' means all program files and so on.

Lines 400 to 550 read in the disc directory. If you look at this closely you will get the idea of how the directory is stored on disc. Line 460 is calculating the file length for instance and lines 480 to 500 get the file name.

Lines 600 to 650 allow the editing of the program names. It is here you could perhaps add another function — maybe one to make the cursor go to the bottom of the screen and then to the bottom of the list.

Lines 700 to 790 list your selected files to the screen and check on buffer size etc. and lines 800 to 900 actually do the copying. The disc is \$10000 is for the machine code and lines \$1000 onwards save the program to disc keeping one back up copy of it.

## Program Listing

```

100 REM ***** 64 Utility *****
110 REM ***** 1000000 *****
120 REM ***** 1000000 *****
130 REM ***** 1000000 *****
140 REM ***** 1000000 *****
150 REM ***** 1000000 *****
160 REM ***** 1000000 *****
170 REM ***** 1000000 *****
180 REM ***** 1000000 *****
190 REM ***** 1000000 *****
200 REM ***** 1000000 *****
210 REM ***** 1000000 *****
220 REM ***** 1000000 *****
230 REM ***** 1000000 *****
240 REM ***** 1000000 *****
250 REM ***** 1000000 *****
260 REM ***** 1000000 *****
270 REM ***** 1000000 *****
280 REM ***** 1000000 *****
290 REM ***** 1000000 *****
300 REM ***** 1000000 *****
310 REM ***** 1000000 *****
320 REM ***** 1000000 *****
330 REM ***** 1000000 *****
340 REM ***** 1000000 *****
350 REM ***** 1000000 *****
360 REM ***** 1000000 *****
370 REM ***** 1000000 *****
380 REM ***** 1000000 *****
390 REM ***** 1000000 *****
400 REM ***** 1000000 *****
410 REM ***** 1000000 *****
420 REM ***** 1000000 *****
430 REM ***** 1000000 *****
440 REM ***** 1000000 *****
450 REM ***** 1000000 *****
460 REM ***** 1000000 *****
470 REM ***** 1000000 *****
480 REM ***** 1000000 *****
490 REM ***** 1000000 *****
500 REM ***** 1000000 *****
510 REM ***** 1000000 *****
520 REM ***** 1000000 *****
530 REM ***** 1000000 *****
540 REM ***** 1000000 *****
550 REM ***** 1000000 *****
560 REM ***** 1000000 *****
570 REM ***** 1000000 *****
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780 REM ***** 1000000 *****
790 REM ***** 1000000 *****
800 REM ***** 1000000 *****
810 REM ***** 1000000 *****
820 REM ***** 1000000 *****
830 REM ***** 1000000 *****
840 REM ***** 1000000 *****
850 REM ***** 1000000 *****
860 REM ***** 1000000 *****
870 REM ***** 1000000 *****
880 REM ***** 1000000 *****
890 REM ***** 1000000 *****
900 REM ***** 1000000 *****
910 REM ***** 1000000 *****
920 REM ***** 1000000 *****
930 REM ***** 1000000 *****
940 REM ***** 1000000 *****
950 REM ***** 1000000 *****
960 REM ***** 1000000 *****
970 REM ***** 1000000 *****
980 REM ***** 1000000 *****
990 REM ***** 1000000 *****
1000 REM ***** 1000000 *****

```



There's nothing like a traditional alien-zapping game to get the adrenalin going! Have fun with this unrespected VIC 20 game from Andrew Booth.

The aim of this game is to shoot as many aliens as possible while avoiding the stars. The game is operated with the following keys:

↑	Left	44-54
↓	Right	57-60
↖	Fire	64-66

Alternatively, you can use a joystick with the fire button to *Interquake*.

# SPACE BATTLE

[Fire number]

6  
9  
14-16  
18-22  
25-26  
29-34  
35-44

Action

Plots your stars and the number of lives left.  
Shows approaching stars.  
Shows alien ship.  
Shows your ship.  
Shows key game.  
Controls shooting.  
Sets screen.  
Sets your shooting and goes to instructions.  
Interact with game.  
Game over you play another game routine.  
You get killed.  
More instructions.  
Sets data for graphics.







## Program Listing 1

```

100 REM *** 1. Input data ***
101 OPEN "IN" FOR INPUT AS #1
102 REM *** 2. Read data ***
103 REM *** 3. Process data ***
104 REM *** 4. Output data ***
105 REM *** 5. End of program ***
106 REM *** 6. Error handling ***
107 REM *** 7. Subroutines ***
108 REM *** 8. Constants ***
109 REM *** 9. Variables ***
110 REM *** 10. Initialization ***
111 REM *** 11. Main loop ***
112 REM *** 12. Exit routine ***
113 REM *** 13. Cleanup ***
114 REM *** 14. Final output ***
115 REM *** 15. End of file ***
116 REM *** 16. End of program ***
117 REM *** 17. End of file ***
118 REM *** 18. End of program ***
119 REM *** 19. End of file ***
120 REM *** 20. End of program ***
121 REM *** 21. End of file ***
122 REM *** 22. End of program ***
123 REM *** 23. End of file ***
124 REM *** 24. End of program ***
125 REM *** 25. End of file ***
126 REM *** 26. End of program ***
127 REM *** 27. End of file ***
128 REM *** 28. End of program ***
129 REM *** 29. End of file ***
130 REM *** 30. End of program ***
131 REM *** 31. End of file ***
132 REM *** 32. End of program ***
133 REM *** 33. End of file ***
134 REM *** 34. End of program ***
135 REM *** 35. End of file ***
136 REM *** 36. End of program ***
137 REM *** 37. End of file ***
138 REM *** 38. End of program ***
139 REM *** 39. End of file ***
140 REM *** 40. End of program ***
141 REM *** 41. End of file ***
142 REM *** 42. End of program ***
143 REM *** 43. End of file ***
144 REM *** 44. End of program ***
145 REM *** 45. End of file ***
146 REM *** 46. End of program ***
147 REM *** 47. End of file ***
148 REM *** 48. End of program ***
149 REM *** 49. End of file ***
150 REM *** 50. End of program ***
151 REM *** 51. End of file ***
152 REM *** 52. End of program ***
153 REM *** 53. End of file ***
154 REM *** 54. End of program ***
155 REM *** 55. End of file ***
156 REM *** 56. End of program ***
157 REM *** 57. End of file ***
158 REM *** 58. End of program ***
159 REM *** 59. End of file ***
160 REM *** 60. End of program ***
161 REM *** 61. End of file ***
162 REM *** 62. End of program ***
163 REM *** 63. End of file ***
164 REM *** 64. End of program ***
165 REM *** 65. End of file ***
166 REM *** 66. End of program ***
167 REM *** 67. End of file ***
168 REM *** 68. End of program ***
169 REM *** 69. End of file ***
170 REM *** 70. End of program ***
171 REM *** 71. End of file ***
172 REM *** 72. End of program ***
173 REM *** 73. End of file ***
174 REM *** 74. End of program ***
175 REM *** 75. End of file ***
176 REM *** 76. End of program ***
177 REM *** 77. End of file ***
178 REM *** 78. End of program ***
179 REM *** 79. End of file ***
180 REM *** 80. End of program ***
181 REM *** 81. End of file ***
182 REM *** 82. End of program ***
183 REM *** 83. End of file ***
184 REM *** 84. End of program ***
185 REM *** 85. End of file ***
186 REM *** 86. End of program ***
187 REM *** 87. End of file ***
188 REM *** 88. End of program ***
189 REM *** 89. End of file ***
190 REM *** 90. End of program ***
191 REM *** 91. End of file ***
192 REM *** 92. End of program ***
193 REM *** 93. End of file ***
194 REM *** 94. End of program ***
195 REM *** 95. End of file ***
196 REM *** 96. End of program ***
197 REM *** 97. End of file ***
198 REM *** 98. End of program ***
199 REM *** 99. End of file ***
200 REM *** 100. End of program ***

```



Two notable pieces of software face the music in these reviews from David Culp and Mike Roberts.

**WAVEFORM (FROM MAYHEM)** for the Commodore 64 is one of those programs that you need to use at least as you get used to it. The packaging is more reminiscent of a child album than a computer program, but it is a soft card and a host of pointers to the disk and manual.

Waveform is essentially a program which will enable you to stretch your 640 chip to its limit. It is a synthesizer program which makes my three year old monophonic outboard look like a band-organ. Waveform obviously realize that most people will want to get more out of their 640 than just a few, very rough-sounding tones, the thing that comes to hand after the device a small area which shows you how to be totally impressed within minutes. When you load the program the screen displays two numbers, one is the LTA, estimated time to arrival the other is the CST, Commodore standard time. The LTA is the time the program should take to load and the CST is the time it actually takes. It does sound impressive but it is awful. Waveform point out that should the program take longer to load than the LTA shows then it is time to have your Commodore Disk drive serviced.

### Creating sound

After a few minutes loading a screen somewhat like the display you see in an Intersim Carc User appears. A grid on the right shows three 'bip' moving backwards and forward and on the left is a mass of lines, squiggles and dots.

At first I thought I would never get the hang of it but the manual is very good and, despite appearances, the display is very logical and easy to use with a mouse. As you would expect you are able to control the three voices of the Commodore and at the top left of the screen is a panel for each voice. The screen goes to sleep independently the type of waveform used in each generation as well as adjusting the ADNR attack, duration, re ease for each voice. Before this you are able to

Continued  
By Barbara Walter

# DIGITAL DUET

adjust the width of the pulse wave and manipulate the duration of the raw sound as well as the envelope position. There are the usual types of filters eg low, high pass etc, tempo controls and switches to turn on or off particular voices. At first it is a bit difficult to see what the on-screen 'cue' 'trace' on the grid is doing but as you work through the very well written manual, the mud clears. Unfortunately I have prior knowledge of things such as how ring modulation and oscillation affects a given sound and so found it difficult to assess whether or not the manual was effective in teaching the 'ground rules' of sound manipulation. In a way you can hear exactly what you are doing with the sound as you change it is possible to get what you like without knowing who you have got it. Knowing the theory though would certainly assist in using the synthesizer to the full.

The 'get you going faster' show you some of the bits in preset scenes and songs referred to in scores. A total of thirty two scenes and twenty two different 'songs of sound' give a potential combination of hundreds of different voices on a three bit track. It took me a couple of days to get past the stage of listening only to the scores. The preset sounds go from the most accurate synthesis of background pipes playing 'Tearing Down the River' to Dr Mike/Cubework type sounds giving really out of this world scenes. Some of the sound



prints I am sure would give you the BBC radio/phone workshop boys drooling. The first step in the manual allows you to play along with any of the preset scores and sounds using any one of the three voices.

### Making music

Instantly I decided I was not so hot yet, as yet unpossessed and doubtful musical talent aside on the machine. There are two ways to enter music into the machine: first you choose the type of keyboard you require. This can be one the standard chromatic scale as loaded on guitars etc. or the types favoured by other musical cultures eg. Hindu, Japanese etc. Choosing different scales means that instead of the usual C-A-D-G, you can have a keyboard that starts A, C-B-F or almost any combination of the above. Secondly though, if you wanted to do a few blunders

then the keyboard would let you the way the notes follow in music of the Indian culture. A very difficult concept to explain and a difficult one to grasp if you are only familiar with the standard keyboard.

When you then choose your keyboard you need enter your notes. The grid shows each voice following a set pattern across the grid. You can then choose which row of notes you wish to enter or edit. When you have the display corresponding to the selected row the screen is split horizontally into two. The top part shows the notes you will play and the bottom shows the octave in which the notes will play. Choosing octaves is extremely easy: a one key long the bottom key you then hit. G-LT your tune is that it flows or like bar charts. As you move your B&B up and down you can hear what you are entering so it is easy to correct mistakes. When you finish you



one you can then move through the grid one line at a time. If all sounds with a touch but takes only minutes to get used to. After that time a pretty easy to use. No knowledge of music is required to enter the selected notes as it can all be done by ear. Using the method of entry it is also easy to copy in standard MIDI music taking quickly and without too many mistakes.

The other way of entering music is to watch into record mode the notes you play using the given keyboard and remembered. You play one note at a time and can hear the first voice while playing the second voice and so on. The music you have entered on the keyboard is represented on your B&B's. This can then be played back and quickly in detail when you want. One device and one with making for easy production of songs. When prompted I was able to transfer data to cassette or (MIDI) to it.

If you like a set of sounds included in the program you can use these as your own compositions, equally it is possible to adjust the sounds that the preset scores are played with. It is important to work through the manual as small points can be missed and it is possible to get into all sorts of things. The only real drawbacks are the way the soundcard responds. It seems a little slow in response to playing and takes a while to get used to. The other two

important one is the relatively small score that can be built up. It is possible to give the impression of a long score by careful repetition but this is not new. I think that the program has a massive amount of potential not only in longer but in the production of a kind of new.

It doesn't mean that you are likely to see legends there using these in their performances but.

If all that, with the addition of the other modules, you, guitar, cannot read or write then can produce music easily and quickly.

### Other modules

They lead me on to the other modules, which are available. The first of these will translate your scores into standard sheet music with the aid of a printer. The module also solves this problem one of the limiting factors. It will extend the length of notes if it is possible to construct without repeat from an interval for professional use. I would imagine. The third module can be used as a stand alone program but is very recommended to be used with the main program. It allows the user to play progress with one key contains a visual mixing mode to allow the user to set up the keyboard into any required arrangement and has many other functions. It would be unlikely to make progress on these two modules as I have not seen them but I feel that the quality of them is probably up to the excellent quality of



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This month, Graham  
Davies, Your  
Commodore's D.I.Y.  
business enthusiast,  
looks at formatting  
numbers and sorting  
data.

# DOING IT YOURSELF

AN IMPORTANT SET OF routines are those which treat variable-sized integers, one decimal place, two decimal places etc, and then format those numbers. Again from the C64A 788, Commodore machines do not have a ROUND function or a PRINT-UNFC command and so we have to write our own. The advantage of being forced to do this is that we can format our numbers exactly how we like them. For instance you might format the number negative one thousand five hundred and thirty three in various ways:

```
-1503
-1503.00
-1503.00
-1503.00
-1503.00
```

or if you were German:

```
-1503.00
```

The BASIC INT command always rounds down (so 1.4, 1.5 and 1.9 will all become 1 if INT is performed on them). We now have to use this limitation to our advantage. The first function to write is a round-off function so that 1.4 = 1, 1.5 = 2 and 1.9 = 2. This is how rounding off is normally performed but if you require different rounding then it is a simple matter of altering the following function.

```
1100 def fn(x) = int(x+.5)
```

The function we have just defined will now round off to an integer and can be used by: a = 1.5 : b = fn(a). To round off to one decimal place simply multiply by ten, perform the round off and then divide by ten.

```
1110 def fn(x) = int(x*10)/10
```

To round off to two, three etc. decimal places, it is a simple extension of the above function.



```

1000 def sort(a) :
1010     n = len(a)
1020     for i in range(n-1):
1030         for j in range(n-i-1):
1040             if a[j] > a[j+1]:
1050                 a[j], a[j+1] = a[j+1], a[j]
1060     return a

```

Having done this, we can now set about formatting these raw data into strings. The easiest way to do this is to write one generic format subprogram for the sample with the most decimal places, two we use and then use smaller subprograms to call this one by simply truncating the string accordingly.

Starting with the generic format routine, we will format numbers to two decimal places and return a string of length five. It is important that the string returned is always the same length so that things will always fit and the list will also make sure that the square handles negative numbers.

Basically, bubble sort is a Shell Sort and a Shell-Sort is a Sort which gives examples of each. The Bubble Sort is the most simple and most popular sort used by micro-computer owners. The principle is to scan along a set of data held in an array, comparing adjacent elements and swapping them if necessary. If there are  $N$  elements in the array then it is to be repeated  $N$  times, one time to ensure that the sort is complete. If an element is at the wrong end of the array to start with, it is going to be swapped a lot of times before it reaches its sorted position. This is obviously going to be slow. Another problem is that for large arrays, the constant swapping of things will cause one of more garbage collections, thus slowing the sort even more. Each pass of

```

1000 for i = 0 to 1 step 1
1010   for j = 1 to n
1020     if(a[j]>a[j+1]) then swap(a[j],a[j+1])
1030   next j
1040 next i
1050 return

```

Example of Bubble Sort

The Shell-Sort is a lot faster because it makes use of more than one generic subprogram and it also does an "intelligence" factor. It starts out with the size of the array as a step production on each of these sorts. This means that less swaps are made and the speed increases naturally. Below is the "insert" gear. Bubble Sort referred to above is also easily modified and was an example if you have an unsorted list such as A C D B B and you do one pass of a bubble sort this will end up with a list like so: A C B D B and it will require another pass to get it into a sorted order. The "insert" routine is to move each item if it has made a swap and then tries to see if further swaps can be made and so on. When it cannot make a swap, it moves forward to continue the rest of the size.

Then the list will become ordered in only one pass. A C B B A goes to A C B D B making the first swap the same as the Bubble Sort but then moving back one item since it may be swapped again then putting A B C D B in only one pass of the sort. The information I have provided you with should be enough for you to see why the Shell-Sort is a lot faster although you will have to modify it in greater detail to fully appreciate it.

The following example sorts numbers into ascending order. All arrays.

Each of these sorts and sort lists is also just creating new arrays to sort into. If you had enough memory for this sort system, then faster methods are available but the above one should be adequate for most applications.

```

1000 sub sort(a) :
1010     n = len(a)
1020     for i in range(n-1):
1030         for j in range(n-i-1):
1040             if a[j] > a[j+1]:
1050                 a[j], a[j+1] = a[j+1], a[j]
1060     return a

```

This routine allows a floating point number up to 999,999.99 to be formatted. The first character returned is either a space or a minus sign depending on the sign of the number. If zero is returned, the first character is also a space. If you want to change this then change the first string in line 1020 to "0.00000". To the symbols you require. This is on the floating negative and positive, so if you wanted a minus sign for negative, a plus sign for positive and an apostrophe for zero, the string would be "-+0".

To format a thing into decimal places, we simply have another subprogram such as:

```

1000 sub sort(a) :
1010     n = len(a)
1020     for i in range(n-1):
1030         for j in range(n-i-1):
1040             if a[j] > a[j+1]:
1050                 a[j], a[j+1] = a[j+1], a[j]
1060     return a

```

For formatting an integer you could still use the same standard routine.

```

1000 sub sort(a) :
1010     n = len(a)
1020     for i in range(n-1):
1030         for j in range(n-i-1):
1040             if a[j] > a[j+1]:
1050                 a[j], a[j+1] = a[j+1], a[j]
1060     return a

```

## Sorting yourself out

The sort subprogram is a very simple one of sorts. This is because it is not too fast and requires a lot of

the data will result in one element ending up in its correct sorted position. After that one element may be sorted correctly but it will have to be swapped a lot of times before it reaches its sorted position. This is obviously going to be slow. Another problem is that for large arrays, the constant swapping of things will cause one of more garbage collections, thus slowing the sort even more. Each pass of

The only for the Bubble Sort is a Shell-Sort and a Shell-Sort is a Sort which gives examples of each. The Bubble Sort is the most simple and most popular sort used by micro-computer owners. The principle is to scan along a set of data held in an array, comparing adjacent elements and swapping them if necessary. If there are  $N$  elements in the array then it is to be repeated  $N$  times, one time to ensure that the sort is complete. If an element is at the wrong end of the array to start with, it is going to be swapped a lot of times before it reaches its sorted position. This is obviously going to be slow. Another problem is that for large arrays, the constant swapping of things will cause one of more garbage collections, thus slowing the sort even more. Each pass of

```

1000 sub sort(a) :
1010     n = len(a)
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1060     return a

```

Example of Shell-Sort





David Crip examines  
the trials, tribulations  
and triumphs of a  
home computer  
wholesaler in this  
profile of PCS South  
West.

# COMPUTERS IN BUSINESS

**DOING SOMERSET** Devon, Cornwall and the Channel Islands PCS SOUTH WEST have grown from very humble beginnings into one of the major home computer wholesalers in the area. Andy Down, founder and present chief, started off as a salesman for a well known record company. As the home computer market started to expand he soon ran the potential and went for a distributor in the South West. He had already been selling records to music at the shops that were now beginning to stock home computers and software, so as a known face he had a head start on other customers. While calling on a customer he heard that a recently formed distribution company were looking for agents to sell his clients throughout the country. Andy left his sales job and within a few weeks he was training the new country as an estate car selling the latest software at competitive prices.

The car was his warehouse at first with his entire stock sealed into formal baskets. It was only a matter of months before it was too small to hold all his stock. Andy says "I didn't want to get too big too quick and so I left the small van again in the house being full of games and a cash business in evening. The evening did and so he was forced to rent space where he could develop the business and put it on a more permanent footing.

## Early days

At about this time the Christmas rush of 80 was just starting. It was necessary for his wife's sister to help run the place while Andy carried on driving around getting into shops and major retail outlets and receiving larger and more orders.

It has always been his intention to keep his product well and so when new software was released he made sure that

Andy Down



he read it himself and could then decide whether or not it was worth stocking. With the title at which new software is released it is not possible for him now to judge everything personally but everything that stock he is judged by one of his workers and their opinion passed on to Andy. Much competition between software houses as it is, software is often released on a large scale months before it is ready. This obviously means that retailers are bombarded with requests for a particular game and on the course Andy is confronted with orders from his retailers. He has to try and placate the retailer by explaining that despite the fact the game is not yet available. He feels that he is in the position between the software house and the customer and has to take a lot of unfair criticism for not being able to meet demands. "It makes me sick as if I am not getting the goods quickly enough and it does reflect on me" he says.

## Primarily software

I pointed out to him that as some titles it was his computer and games sales had now reached their peak and would slow down a slow decline. He reacted with one of his typical "He said that once he had started there had been a progressive rise in sales and he had wanted to continue to grow. He said that unlike the hardware and CLI sales, computers could always offer something new, an original game or a new application. Because of this he feels that although the rate of increase although the rate of increase may slow down at present and the market becomes more powerful there will always be a good market. Unlike many distributors he has not become too deeply involved in stocking the computers themselves. He will supply the hardware but only carries a small stock or goes to order. He says "If you get a bad batch of games it does not

mean a massive amount of money has to be found in order to credit the retailer, however this could then require a large investment and you only need a few minutes in order to swap a few discs in the bank account."

## Christmas rush

When I was there Andy was preparing for the Christmas rush. During the period when games will be dead and which games will become popular is a nightmare, he says, and that is without any new releases that may appear between now and Christmas. From now I could see while I was there it seemed he had a very good 'nose' for predicting the buyers as when the phone ring he could be to almost every order, and many of the small fast orders were due to being out of stock.

I went to see Andy late one afternoon and while trying to see some of Andy's new records, was waiting an order for a stock in hand. The order had only been received at five o'clock but it was being put together and would be delivered by about six o'clock. He seemed to hear what Andy had said about trying to get orders to the customer as fast as possible. Andy had started with Andy on a job dealing software but Andy told me that he would be kept on as a full time employee after the scheme had finished. He said he enjoyed the work and Andy was a good boss who would make the best of any situation that was expected and the new person taken over only a couple of months ago are already too small. New members are required already and possibly more staff to cope.

## Expansion

By the time you read this Andy will have made great strides towards more expansion and should be distributing nationwide. He will obviously need more people on the road



to do this but he says otherwise happens he will not take a lay rate and continue to offer last in first out service, that means Andy to buy software on larger quantities and therefore at a lower price. This should be fine, but he is aware there are some people who will not, so he looks, these savings should be passed onto the customer.

Looking around I could see a Spectrum, Commodore 64 and a Dragon and there were being used to evaluate the ad range of new releases. The games were getting a good review and two were hardly released. "According to the adverts" says Andy "the is supposed to be the best thing since sliced bread. The graphics on the title page are brilliant but the game is a disaster, but due to the massive amount of money spent on publicity it will sell and I am sure a lot of kids will be disappointed". A large box of tapes, manuals and a copy set by the office door. Andy told me that they were faulty returns, but when they check through he looks up many of them and perfectly OK and promises that when instructions have not been followed or tapes have been ripped then after back to the store is as fast and simple as turn back to have a quick fix. It is one of the best that I have to admit. The very, however through the box myself I could see what he meant. I could see that on such things as controls more of the returns were due to misuse. It seems that rather than upset retailers Andy will take them back on a lot of cases and simply repair or replace them.

One of the other staff who works in the office is a young girl, so I asked, what she is up to as she is in a job cross-section scheme. Andy tells that three schemes are an excellent thing and a rough they are awarded by some of the whole they is big benefits to the people on them and to the employees. Certainly this is Andy's case as all the people on schemes tend to be in high rates, some space on to full time.

## Peripherals

Apart from games Andy's second best order is, again, it is now been a lot of peripherals a colour, tapes and tape drive, while I was there, a most every order included some peripherals. He tells me that they seem to be the first peripheral bought after the computer. One order comes now.

I asked Andy if he wanted to become involved in software writing himself. I was to find out that he was in fact marketing an adventure game for the Spectrum under his own label. It was written using the Quill, a piece of software Andy runs highly, and is available for both the Spectrum and Commodore 64. It is called PLANNET and so far seems to be doing very well. Plans for further orders are not yet clear.



## Piracy

I asked him if he had seen or been offered any pirated copies of popular games. He immediately responded with an unambiguous sentence of what he thought about pirate tapes. He has seen very good copies of popular games, but he says they are a crime for dealers. As the software companies have to put up prices to cover the losses due to pirate copies, so do dealers. Many copies are made due to the price and so on. It is a vicious circle which cannot be stopped once a person has started. Who is going to spend hours writing and marketing high quality software only to see it ripped off within days of its release and, in some cases, before it is released? Not only will the prices fall but the quality of software will drop.

## American software

A group of quality Andy pointed out to me some of the new releases from the USA. They had to be sure to be selected. He says that his reputation of high quality software will bring UK orders

to their hand and long about the quality of their own goods. Although he is not too interested in that will obviously go under he feels it is only right that the customers should be able to see the best available for their machine. He is a little worried about the state of the pound of late and says that just at the price of imported software should have been dropped, long went the exchange rate. This will make price rising difficult and is a few cases may even mean upping the price of imports. He also pointed out to me that over here we are only seeing the best of the American games, the ones that cost less than you can find a lot of very low quality software for us.

I asked him what he thought about the high margins prices over here compared with the States. He told me that unfortunately he felt it was a little difficult for the same. He says that apart from the exchange rate the sheer volume of sales potential over there means profit margins can be very low. If you can sell a machine or peripheral to just 1% of more over there you are talking about hundreds of thousands of sales. It is the same for everything over there - cars, records the lot. I was a bit lost so he meant.

## Business sense

Andy is pleased to see home computers being used for other things as well as games. When I first started it was almost impossible to get any business software for any of the machines and what you could get was not worth having. That has all changed now and some of the business software for the Commodore 64 for instance is already more superior than software that is being run on real business machines". He said.

At the moment Andy is looking to get his business computer. Andy told me "It is a hard task. I need a powerful machine and powerful machine and the amount of information I need to store will, without doubt, require a hard disc system. It is a need something that will grow with the business as soon as the system set up I don't want to find out in a few months I've spent more on a decision on the machine than I have on getting the right software".

For a non-computerised office everything was

surprisingly well ordered. Andy said that speed was important to him and that he had to have everything well organised. This was borne out by the fact that every order was made and sent very fast. Orders were late in being delivered. It was his habit, in that had asked him, would more orders have failed. There is no hard set there. We don't get on our phone all the time asking for orders. People know where we are and they will order from us as long as we do what we do well.

"Our main goods round most of our customers once a week or at least once a fortnight. The shops are, in most cases, able to take their stock immediately from the van. They can tell us what they are having at the time and not having to rely on what they have read about it. Of course it is not possible for us to rely on our dealers. Take the Channel Islands for instance, all the business there is done by post or telephone. If a shop is not too far out they can go on a regular route. That was they know when we will be there and that they will find plenty of stock in the van, of course many can still order between visits and we send orders out the same day or the next morning at the latest. In some cases we find that the post gets everything where we need it very quickly but urgent orders can be sent by courier. This means that people often have their orders by the next morning."



## Final note

While I was in the office another appointment was offered with PCS. A customer in Devon was associated with their present website and had heard from another dealer that PCS 5 was more fast and reliable. That customer would have been found to turn the next day. Andy tells me that they rarely have to go out and find new business. These enquiries is spreading and more new accounts come through recommendations. Andy also is a good indication that he is still going things right and will continue to do it in the very growing bigger and better later.



More companies than ever before appeared at this year's PCW show. Your Commodore was there to sample their wares.

# SHOWDOWN AT OLYMPIA

**AND COMMERCIAL, BUT** THE olympia on this September for live fans a regular influx of businessmen and during its grandstand and open exhibitions may had through the doors of Olympia? They were made, even to toddlers and babies present. The concentration of traders exploring their wares made it all too clear that the show starts early in the computer world.

The 21st PCW show had arrived in town. Distributed over three levels of the exhibition centre with the 'big names' on the ground floor, business on the first level and entertainment on the second, this year's exhibit has not been led by the organisers as the 'biggest and best' set. Instead it relied on gaily lit and with colour and animation, American hostesses with their fingers in the air. Amongst the PCW buzz on his arrival and a crop of featurette girls. But, under cover of the fun and frolics, the war was on for battle (not only on the computer content) and even more turned to the competition.

## Commodore live

Here, contrary to the three tiers of the occasion Commodore fans had its exhibit unless they had made their entrance (flitting through a back window) for becoming Commodore's great problems. Machines and peripherals, old and new, were out of a parade line of Commodore red, white and blue. Commodore's four stands, including also the new models and a host of software, were strategically placed to the left of the main entrance.

But Commodore obviously kept heads competition is illustrated by the last display room software houses up and down the country.

## Sport and spies

The football season got off to a flying start with Audiotape Games' Football Manager and Argus Press Software's much advertised American football sport was also featured with Ceman's 'Buddy Thompson's Decision' and Quicks' 'Let's Summer Games' based on the summer's Olympia Games.

Any budding Shakespearean PC player might have been inspired to enter the world of comic lighting as A&A's present was 'Carnage', Hill Mary C. Jones' 'Special Agent' or Amiga's 'P.C. Hunt'. The latter programme was Ceman's 'Queen's Aid', featuring footmen and a secret agent's scheme, which was also loaned to the public at the PCW show.

## Audiogenic and Beyond

Audiogenic went out to prove that big business wasn't all fun and games with their Commodore 64 business packages for the small businessman - 'Budget 40', 'Manager' and 'Bank'. They also catered for any sporting spirit with their Football graphics tables which explore the evolution of full colour drawing and illustrations drawn on the screen. But Audiogenic are still entrenched in the games world with its recent disk-based games.

'Action in Wonderland' (an adventure based on Lewis Carroll's novels), 'Famous Football', 'Peggy's', 'Forbidden Forest', 'Auntie Chatterbox' and



## 5000

Beyond, already specialised for their best-selling Spectrum games, Argus and The Lords of Hothlight, have released a television of Python, Python 40, along with 'A&A's', 'Auntie' and 'Mr Robot'. And in the offing at the time of going to press were 'My Child II' and 'Pe-Warrior'.

## Bubble Bus and co

Parked on the ground floor tucked behind the Commodore stands was Bubble Bus Software 'Cave Fighter' described as 'an all action jumping, climbing and shooting game', a title later released for the 64. But Bubble Bus were also showing off other investments with a 'Bumping' (3000), '9000' (4000) and 'Widow Revenge' for the 64 and 'Amazons' (4000), 'Bewitched' and 'The Cank' for the VIC 20.

Creative Sports went from perambulator with 'Mac Boy', to the infectious, with 'Carnage'.



## GUMSHOE



Mouse in Double Trouble, based on the popular TV cartoon character. And *Woolf* was being so busy poor old Clumber again with his new Commodore 64 game, *Clumber* from the house of Drom.

Channel 8 this, don't have sleep too many of these fans with these new arcade games for the 64. *Phase II* and *Terra Zone* follow similar play-attack themes and, on Channel 8's other space game, *Attack the Amazing Bag Head Beast* from *Domipower*, falls out of his spaceship into a marsh on earth, you must save him back to his ship.

### Hero time

Action-packed adventure was extra in the 64 with *Hero's Adventure*, M. P., *Adventure Hero's Time*, *Solo 8-in'* and *Donor's High Moon*. As *Solo* said, your aim is to arrive at all points of the legendary Dragon Arduus which dodging the dangers which cross your path. In *Time Solo Hero*, you move your character through the Arabian desert and, with luck, into the Sultan's treasure. *Adventure Solo* is a Western Adventure where you must keep the peace in a frontier town by chasing the bandits and preventing them from robbing with the gold or gold, a feature in any saved character — *High Moon*, the Western.

*Heroes* also featured in New Generation's *Cliff Hanger* in which our hero Cliff must stop the evil

bandits from stealing up the canyon. It features cartoon-style weapons and humor, based on the popular road-runner series.

### Animal magic

Things turned here again as *Wizardsoft* with Geoff Meier's game offering, *Two peas*. Mr. Meier down has the *Acropolis* as his hanging-looking *Two* ball-man, ball-gate creature which travels across the planetary surface in three stages and the game includes 100 rooms, goals to control and the value of the park. *Two* the *Acropolis* game, *Two* the *Acropolis* game also gave animal creators with three

## CLIFF HANGER



Commodore version of *Two peas*.

### Final offerings

Bikes and cars await final set to conquer games and the team was certainly no exception with *Marshall's The Official Dodge Rod Jump Challenge*. *Marshall's Power Truck Car* and *Car Journey* from *Full Blast* Games.

Also new from *Marshall's* game *Stuntin' Rod* for the 64 but there had to have the weight with other *Marshall's* games like *Chase*, *Cyberman*, *Marshall's*, *Stuntin' Rod* and *Stuntin' Rod*.

*Acropolis*, one of the leading lights in 64 software,

a week headlines of the top games for the 64 — *Wizard's*, *Hero's*, *Time Solo 8-in'*, *Donor's High Moon* — as well as these *Domipower* *Two* which enables you to draw on the screen with a pen.

And there were many more besides — *High Moon* several publishers of the Rabbit brand name and logo with *Hero's* and *Marshall's* *Power Truck Car* and *Car Journey* from *Full Blast* Games such as *Two peas*, *Two* and *Acropolis*, and graphics editors from *Marshall's* *Chase* and *Marshall's*, as well as their own set of books and magazines (although only one of these, of course, was a worth purchase).

## Bumping Buggies

COMMODORE 64



bubble bus software

## Widows Revenge

COMMODORE 64



bubble bus software

As seen in the national press

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# BEHIND CLOSED DOORS

SLIDING WITHIN THE lurch of *Fight Zone-One-Five*, a first simulator for the unexpanded VIC-20, it contained no graphics but proved that outstanding software could be reproduced at just 1.5% of necessary hardware if it was sold upwards of \$8,000, and a still selling.

Its creator was John Wagstaff. A very tall gentleman with long black hair, he started employment at the age of 17 in a (background with his parents) John then became a musician, receiving good credit for songs he had written. He earned fame and fortune in Germany, anywhere who has ever heard of the *Krautrock* is all right, that John and John are one and the same! But he soon discovered that even though he had 'made it' in Europe to a certain extent, the money did not immediately come pouring in. With cash running low and no way home from going mad, John bought a VIC-20 for £200. He taught himself to program and, a year or so later, released *Fight Zone-One-Five* followed by *Wheland One-Five*, which achieved moderate success, and, finally by his latest baby, *System 15000*, a commercial one game.

## Craig Communications

The first company to accept John's software and distribute it was NRG, where David Cole was already working as the sales force of the two main operators. His idea was to visit shops and persuade them to buy various titles distributed by NRG. After two months, David's efforts proved so successful that NRG were bought up by a larger concern — Ferraro & Craig, who had been looking for a company to handle distribution. Richard Craig, the first president of the 'new' spotted NRG.

Through the change, John Wagstaff's software was still selling and, finally, *System 15000* was released. In May 1984 Richard Craig left Ferraro &



John Wagstaff — rock star turned programmer

& Craig taking over from David Cole (and, obviously, John's software). A brand new company emerged from this reshuffle — Craig Communications with David Cole in charge of the software side and Richard Craig responsible for the rest of the operation. The release of all John Wagstaff's software followed swiftly, with a better price presentation for *System 15000* and, curiously, *Wheland One-Five* had not received under Ferraro &

Craig's guidance. The latter was now set for *System 15000* to be distributed under its new name.

## System 15000

*System 15000* is a new breed of game. Whereas with a normal adventure, you're the game can whisk you off to an island or transform you into a detective in hot pursuit of a murderer, *System 15000* turns your computer into a

computer, the monitor into a monitor and plugs an imaginary room into the back of the computer, thus introducing you to the BNC's 'Bad of Pory' approximation. In such a simple idea yet so one has thought of it before now.

*System 15000* also differs from other adventures in that when it is a modern simulation game, you can, by dialling a number, return again and again to various computers at any time in the game. It is a



genuine real-time communications investigation. For those not familiar with it already, the following concepts should attract both interest and enthusiasm.

Your friend's company has been ripped off in the tune of 1,500,000 dollars in a deal it has negotiated. A colleague has contacted you, giving System 1000 and a modem setup and asking you to help get the money back into the bankrupt company's bank account. He also provides one telephone number, an access code and two names; armed with this information, you open your investigation.

After confidently appointing John Wagstaff in the pleasant surroundings of his living room, trusty pen poised above paper, I asked him where he found the idea for System 1000.

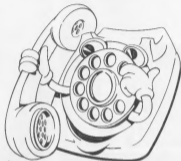
"It just came to me and, at first, I could not believe it. So obvious, yet after almost endless searching through magazines and the like, I could not find any indications of other people being there first."

How long had I taken him to write it from the initial concept to the finished product? "Almost nine months of blood, sweat and tears," was the reply. David Gilm appeared and weighed in with, "John wouldn't even tell me what it was until he had completed a ready for playing — and even then he refused to tell me how to proceed. He just said 'play it'." I must agree—the detailed instructions are very sparse but, according to him, this is totally intentional. With the old-age consideration of value-for-money, I asked whether the price was not a little steep — at 112.95 (somewhat excessive for a single program) John's reply was quite logical and emphatic.

"People can, and sometimes do, pay in excess of 112.95 for a hard-back book of words and find that they are getting good value. The same applies to good software with its underlying creative base, intellectual challenge and complexity. If it gives you a good run for your money, where's the argument?"

I personally do not need any persuasion in this respect. Having myself reviewed quite a number of game programs and obviously wishing for more writers of John's calibre and standards, I am emphatic that he is aimed to produce good quality software rather than higher quantities of less memorable products — in regards with strong dislike the computer

# \$15,000



who flood the market with mediocre products, thus depriving a positive potential for intellectual and, at the same time, entertaining pursuits.

I saw a great deal in the good people who buy my software — it pays revised bills and stops me from starving. But, after all, is there I got my first computer. I wasn't having much success in getting my money for the result. I produced for the German market, and we were literally starving. I am sure that having that computer did stop me from going mad!

Remembering how of his earlier statement that it took nine months to write System 1000, I asked if he had experienced any problems. He chuckled:

"I have a little saying that every programmer should write out and place above his computer: 'THEORETICALS

ONE MORE BUG!'

I pressed him, and he continued:

"The telephone aspect of the game did present a problem in two, inter-related which I insisted for the American version of the game turned out to be 'That's Blue John' I changed it, but quick! I also had to get permission from the various telecommunications authorities for the use of their different dialling and equipped tones for the U.K. and overseas.

## Music and computers

Apart from John's first computer wailing off messages mainly, were there any other reasons for deciding on the purchase?

"Yes, I am in the entertainment business and, at

the personal level, they are bought mostly for entertainment and have become instruments, both audio and visual for entertainment purposes. Music is after all a form of software, a complex writing code embracing different interpretive functions with both intellectual and entertainment potential. Computers and software can be made to perform the same functions, the only difference being that computers are interactive with the operator."

John, as I have already said, is an accomplished musician. On the wall above where we sit hangs a gold record and, alongside, a gold cassette for 10000 copies sold of Right Zero-One-Five presented, especially enough, to Bernard & Coop!

Does he use computers making an even larger impact in the music press?



# ANIROG

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COMMODORE 64 VIC 20

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Experience the thrills of the gambling world of the world from the comfort of your own armchair. Each version includes features such as spinning reels, hold, number feature nudges, gamble correct, operators and bonuses. The Commodore 64 version has additional features, nudges, reels and kudos \$, wrap-a-reel and bonus modes.

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